



TECHNICAL DATASHEET

ASME DESIGN

KROMBACH® TUFSEAT®
Performance Series Ball Valves
TUFSEAT by KROMBACH - THE SUPERIOR MSBV



Features and Benefits

KROMBACH® TUFSEAT® PERFORMANCE SERIES

The KROMBACH® TUFSEAT® Ball Valve Performance Series combines critical safety and performance features required for demanding service applications in chemical and refining markets.

STANDARD DESIGN

- Class V seat leak performance
- Up to 500F / 260°C
- Up to 10% Solids
- Hard Chrome or Nickel Alloy coatings on ball and seats
- Design acc. to ASME B16.34
- Floating Ball: KFO 1176 (1/2" to 6" / 150# and 300#)
- Trunnion: KFO 9176 (8" to 12" / 150# and 300#)

HIGH TEMPERATURE TRIM DESIGN

- Class VI seat leak performance
- Up to 800F/ 427°C
- Up to 20% Solids
- Nickel Alloy, Chrome and Tungsten Carbide coatings on ball and seats available
- Floating Ball: KFO1156 (1/2" to 6" / 150# and 300#, 1/2" to 1-1/2" 600# and 900#)
- Trunnion: KFO 9156 (2" to 12" / 150#, 300#, 600# and 900#)

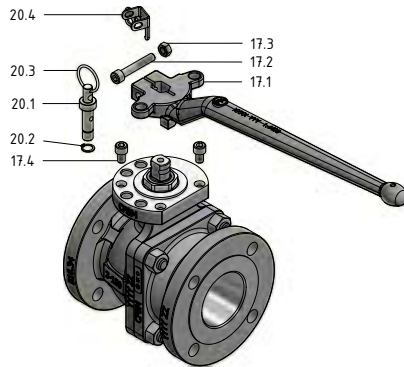


Product Range

| Size | Class | Body Design | Face-to-Face Dimension | Body Material |
|--------------|---------------|--|---|-------------------------------|
| 1/2"-6" | Class 150-300 | 2-piece design Flanged Floating Ball | ASME B16.10 Long Pattern EN 558-1 Series 12 & 14 | WCB / 1.0619 CF8M / 1.4408 |
| 1/2"- 1 1/2" | Class 600-900 | | | |
| 8"-12" | Class 150-300 | 2-piece design Flanged Trunnion Design | | |
| 2"-12" | Class 600-900 | | | |

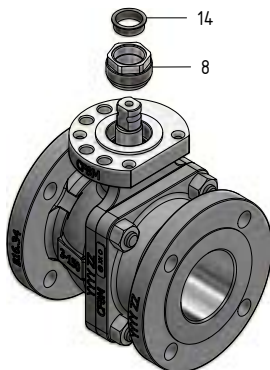
Floating Ball Design

Lever Design



| Item | Quantity | Description | Carbon Steel | | Stainless Steel | |
|------|----------|---------------------------|--------------|--------|-----------------|--------|
| | | | ASTM | DIN | ASTM | DIN |
| 17.1 | 1 | Hand lever | A351 CF8M | 1.4408 | A351 CF8M | 1.4408 |
| 17.2 | 1 | Hex socket head cap screw | 316SS | A4-70 | 316SS | A4-70 |
| 17.3 | 1 | Hex nut | 316SS | A4 | 316SS | A4 |
| 17.4 | 2 | Hex socket head cap screw | 316SS | A4-70 | 316SS | A4-70 |
| 20.1 | 1 | Locking pin | AISI 316 | 1.4401 | AISI 316 | 1.4401 |
| 20.2 | 1 | Retaining ring | - | 1.4122 | - | 1.4122 |
| 20.3 | 1 | Ring | AISI 301 | 1.431 | AISI 301 | 1.4310 |
| 20.4 | 1 | Locking plate | 316Ti | 1.4571 | 316Ti | 1.4571 |

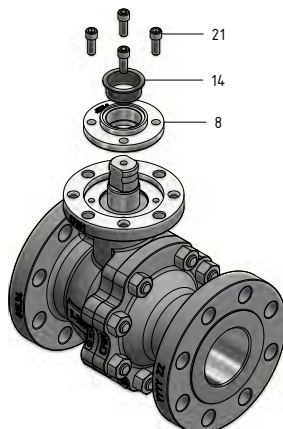
Press Nut Design



| Item | Quantity | Description | Carbon Steel | | Stainless Steel | |
|------|----------|---------------|----------------------|----------------------|----------------------|----------------------|
| | | | ASTM | DIN | ASTM | DIN |
| 8 | 1 | Press nut | A275 Gr. 431 | 1.4057 | A275 Gr. 431 | 1.4057 |
| 14 | 1 | Guide bushing | PTFE - Carbon filled | PTFE - Carbon filled | PTFE - Carbon filled | PTFE - Carbon filled |

Sizes 1/2"-150# to 3"-150# and 1/2"-300# to 2"-300# and 1/2"-600# to 1 1/2"-600# and 1/2"-900# to 1 1/2"-900#.

Packing Gland Design



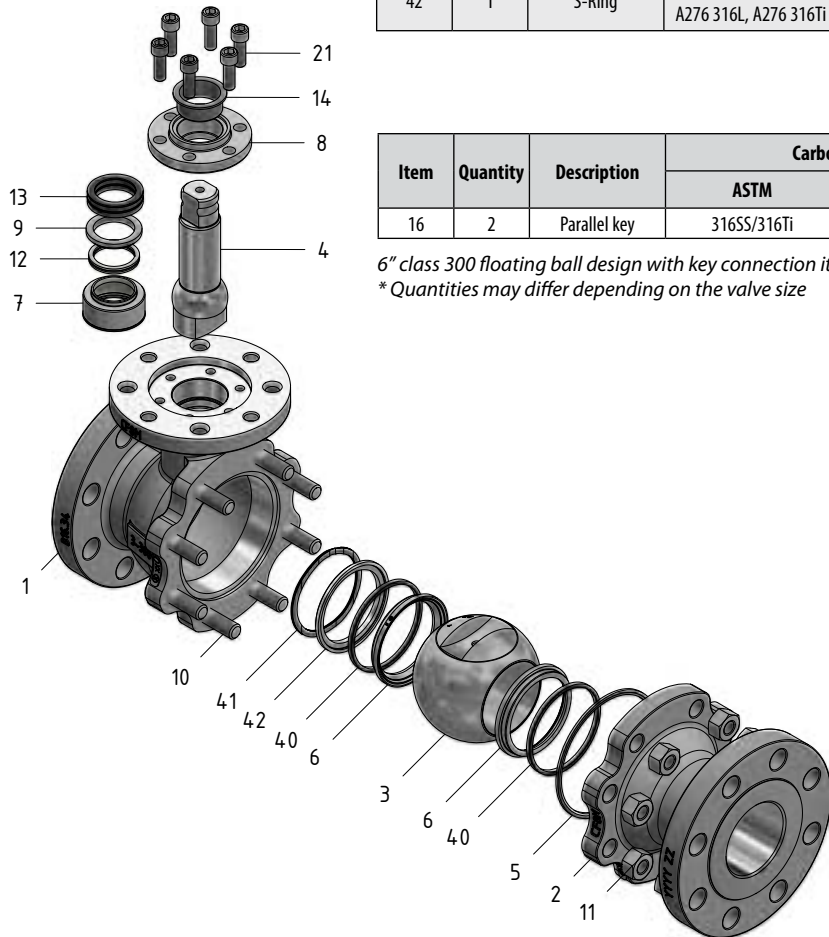
| Item | Quantity | Description | Carbon Steel | | Stainless Steel | |
|------|----------|---------------------------|----------------------|----------------------|----------------------|----------------------|
| | | | ASTM | DIN | ASTM | DIN |
| 8 | 1 | Packing gland | A479 316Ti; 316SS | 1.4571; 1.4401 | A479 316Ti; 316SS | 1.4571; 1.4401 |
| 14 | 1 | Guide bushing | PTFE - Carbon filled | PTFE - Carbon filled | PTFE - Carbon filled | PTFE - Carbon filled |
| 21 | 4 | Hex socket head cap screw | A193 B8M Class 2 | A4-70 | A193 B8M Class 2 | A4-70 |

Sizes 4"-150# to 6"-150# and 3"-300# to 6"-300#

Floating Ball Design Standard Trim Class 150-300

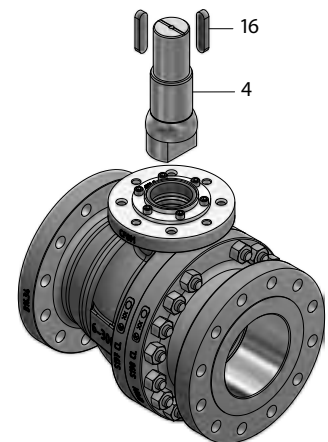
Floating Ball Design

| Item | Quantity | Description | Carbon Steel | | Stainless Steel | |
|------|----------|---------------------------|---|-------------------------------------|---|--|
| | | | ASTM | DIN | ASTM | DIN |
| 1 | 1 | Body | A216 WCB | 1.0619 | A351 CF8M | 1.4408 |
| 2 | 1 | Tail | A216 WCB | 1.0619 | A351 CF8M | 1.4408 |
| 3 | 1 | Ball | A182 F316L+coating | 1.4404+coating | A182 F316L+coating | 1.4404+coating |
| 4 | 1 | Stem | A276 Gr.431 | 1.4057 | A276 Gr.431 | 1.4057 |
| 5 | 1 | Body gasket | PTFE/Graphite/316Ti | PTFE/Graphite/1.4571 | PTFE/Graphite/316Ti | PTFE/Graphite/1.4571 |
| 6 | 2 | Seat | A182 F316L +coating | 1.4404+coating | A182 F316L +coating | 1.4404+coating |
| 7 | 1 | SX Stem seal | TFM | TFM | TFM | TFM |
| 8 | 1 | Packing gland | A479 316Ti, 316SS | 1.4571, 1.4401 | A479 316Ti, 316SS | 1.4571, 1.4401 |
| 9 | 1 | Support Ring | A479 316Ti, 316SS | 1.4571, 1.4401 | A479 316Ti, 316SS | 1.4571, 1.4401 |
| 10 | 4 | Stud | A193 Gr.B7 | 1.7225 | A193 Gr.B8M Cl.2 | A4-70 |
| 11 | 4 | Heavy hex nut | A194 Gr.2H | 1.7225 | A194 Gr.8M | A4-70 |
| 12 | 1 | Spring energized lip seal | PTFE - Carbon+Graphite filled / AISI 301 | PTFE-Carbon+Graphite filled/ 1.4310 | PTFE - Carbon+Graphite filled / AISI 301 | PTFE - Carbon+Graphite filled / AISI 301 |
| 13 | 1 | Packing set | Graphite | Graphite | Graphite | Graphite |
| 14 | 1 | Guide bushing | PTFE - Carbon filled | PTFE - Carbon filled | PTFE - Carbon filled | PTFE - Carbon filled |
| 21 | 4 | Hex socket head cap screw | A193 B8M Class 2 | A4-70 | A193 B8M Class 2 | A4-70 |
| 40 | 2 | Seal ring | Graphite | Graphite | Graphite | Graphite |
| 41 | 1 | Wave spring | 17-7 PH | 1.4568 | 17-7 PH | 1.4568 |
| 42 | 1 | S-Ring | F51, A276 UNS S31803, A276 316L, A276 316Ti | 1.4462, 1.4404, 1.4571 | F51, A276 UNS S31803, A276 316L, A276 316Ti | 1.4462, 1.4404, 1.4571 |



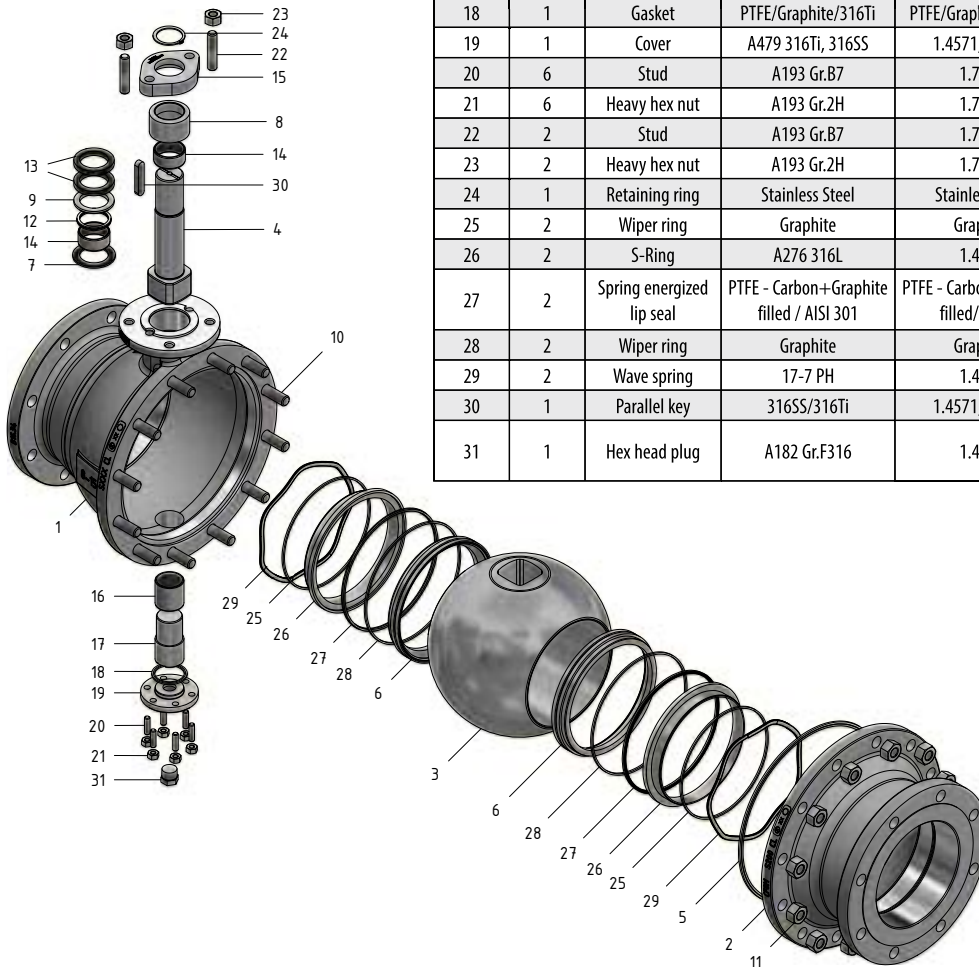
| Item | Quantity | Description | Carbon Steel | | Stainless Steel | |
|------|----------|--------------|--------------|----------------|-----------------|----------------|
| | | | ASTM | DIN | ASTM | DIN |
| 16 | 2 | Parallel key | 316SS/316Ti | 1.4571, 1.4401 | 316SS/316Ti | 1.4571, 1.4401 |

6" class 300 floating ball design with key connection item 16
*Quantities may differ depending on the valve size



Trunnion Design Standard Trim Class 150-300

Trunnion Design

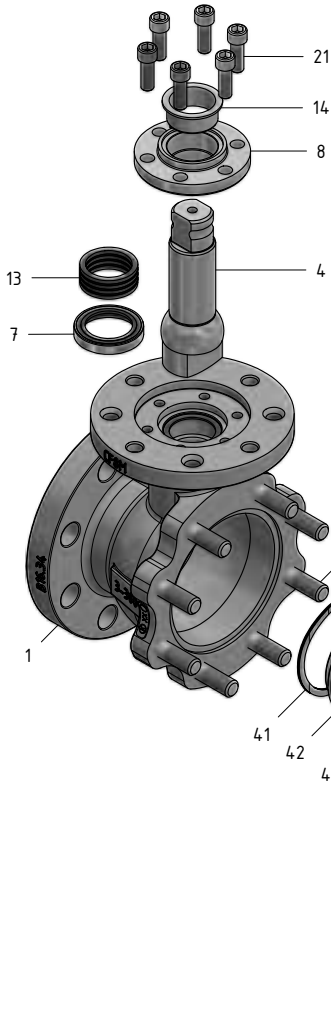


| Item | Quantity | Description | Carbon Steel | | Stainless Steel | |
|------|----------|---------------------------|--|--|---|--------------------------------------|
| | | | ASTM | DIN | ASTM | DIN |
| 1 | 1 | Body | A216 WCB | 1.0619 | A351 CF8M | 1.4408 |
| 2 | 1 | Tail | A216 WCB | 1.0619 | A351 CF8M | 1.4408 |
| 3 | 1 | Ball | A351 CF8M+ coating, A182 F316L+ coating | 1.4408 +coating, 1.4404 +coating | A351 CF8M+ coating, A182 F316L+ coating | 1.4408+ coating, 1.4404+ coating |
| 4 | 1 | Stem | A276 Gr.431 | 1.4057 | A276 Gr.431 | 1.4057 |
| 5 | 1 | Body gasket | PTFE/Graphite/316Ti | PTFE/Graphite/1.4571 | PTFE/Graphite/316Ti | PTFE/Graphite/1.4571 |
| 6 | 2 | Seat | A182 F316L+ coating | 1.4404+ coating | A182 F316L +coating | 1.4404+ coating |
| 7 | 1 | Thrust washer | Inconel 625+ coating | Inconel 625+ coating | Inconel 625+ coating | Inconel 625+ coating |
| 8 | 1 | Gland | A582 303 | 1.4305 | A582 303 | 1.4305 |
| 9 | 1 | Support Ring | A479 316Ti, 316SS | 1.4571, 1.4401 | A479 316Ti, 316SS | 1.4571, 1.4401 |
| 10 | 12 | Stud | A193 Gr.B7 | 1.7225 | A193 Gr.B8M Cl.2 | A4-70 |
| 11 | 12 | Heavy hex nut | A193 Gr.2H | 1.7225 | A194 Gr.8M | A4-70 |
| 12 | 1 | Spring energized lip seal | PTFE - Carbon+Graphite filled / AISI 301 | "PTFE - Carbon+Graphite filled/1.4310" | PTFE Carbon+Graphite Filled/ AISI 301 | PTFE - Carbon+Graphite filled/1.4310 |
| 13 | 1 | Packing set | Graphite | Graphite | Graphite | Graphite |
| 14 | 2 | Sleeve bearing | 316L+ coating | 1.4404+ coating | 316L+ coating | 1.4404+ coating |
| 15 | 1 | Gland flange | A516 Gr.70 | 1.0425 | A240 316Ti, 316SS | 1.4571, 1.4401 |
| 16 | 1 | Sleeve bearing | 316L+ coating | 1.4404+ coating | 316L+ coating | 1.4404+ coating |
| 17 | 1 | Bottom stem | A479 316Ti, 316SS | 1.4571, 1.4401 | A479 316Ti, 316SS | 1.4571, 1.4401 |
| 18 | 1 | Gasket | PTFE/Graphite/316Ti | PTFE/Graphite/1.4571 | PTFE/Graphite/316Ti | PTFE/Graphite/1.4571 |
| 19 | 1 | Cover | A479 316Ti, 316SS | 1.4571, 1.4401 | A479 316Ti, 316SS | 1.4571, 1.4401 |
| 20 | 6 | Stud | A193 Gr.B7 | 1.7225 | A193 Gr.B8M Cl.2 | A4-70 |
| 21 | 6 | Heavy hex nut | A193 Gr.2H | 1.7225 | A194 Gr.8M | A4-70 |
| 22 | 2 | Stud | A193 Gr.B7 | 1.7225 | A193 Gr.B8M Cl.2 | A4-70 |
| 23 | 2 | Heavy hex nut | A193 Gr.2H | 1.7225 | A194 Gr.8M | A4-70 |
| 24 | 1 | Retaining ring | Stainless Steel | Stainless Steel | Stainless Steel | Stainless Steel |
| 25 | 2 | Wiper ring | Graphite | Graphite | Graphite | Graphite |
| 26 | 2 | S-Ring | A276 316L | 1.4404 | A276 316L | 1.4404 |
| 27 | 2 | Spring energized lip seal | PTFE - Carbon+Graphite filled / AISI 301 | PTFE - Carbon+Graphite filled/1.4310 | PTFE Carbon+Graphite Filled/ AISI 301 | PTFE - Carbon+Graphite filled/1.4310 |
| 28 | 2 | Wiper ring | Graphite | Graphite | Graphite | Graphite |
| 29 | 2 | Wave spring | 17-7 PH | 1.4568 | 17-7 PH | 1.4568 |
| 30 | 1 | Parallel key | 316SS/316Ti | 1.4571, 1.4401 | 316SS/316Ti | 1.4571, 1.4401 |
| 31 | 1 | Hex head plug | A182 Gr.F316 | 1.4401 | A182 Gr.F316 | 1.4401 |

Floating Ball Design High Temperature Trim Class 150-300

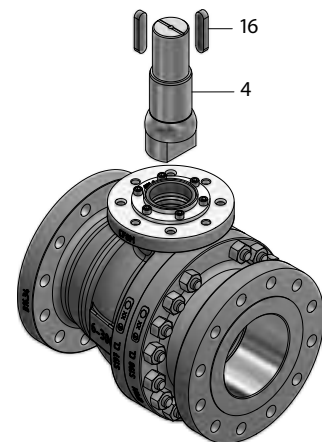
Floating Ball Design

| Item | Quantity | Description | Carbon Steel | | Stainless Steel | |
|------|----------|---------------------------|---|------------------------|---|------------------------|
| | | | ASTM | DIN | ASTM | DIN |
| 1 | 1 | Body | A216 WCB | 1.0619 | A351 CF8M | 1.4408 |
| 2 | 1 | Tail | A216 WCB | 1.0619 | A351 CF8M | 1.4408 |
| 3 | 1 | Ball | A182 F316L+coating | 1.4404+coating | A182 F316L+coating | 1.4404+coating |
| 4 | 1 | Stem | A276 Gr.431 | 1.4057 | A276 Gr.431 | 1.4057 |
| 5 | 1 | Body gasket | Graphite/316Ti | Graphite/316Ti | Graphite/316Ti | Graphite/316Ti |
| 6 | 2 | Seat | A182 F316L +coating | 1.4404+coating | A182 F316L +coating | 1.4404+coating |
| 7 | 1 | S2 Stem seal | e-Carbon | e-Carbon | e-Carbon | e-Carbon |
| 8 | 1 | Packing gland | A479 316Ti, 316SS | 1.4571, 1.4401 | A479 316Ti, 316SS | 1.4571, 1.4401 |
| 10 | 4 | Stud | A193 Gr.B7 | 1.7225 | A193 Gr.B8M Cl.2 | A4-70 |
| 11 | 4 | Heavy hex nut | A194 Gr.2H | 1.7225 | A194 Gr.8M | A4-70 |
| 13 | 1 | Packing set | Graphite | Graphite | Graphite | Graphite |
| 14 | 1 | Guide bushing | A582 303 coated | 1.4305 coated | A582 303 coated | 1.4305 coated |
| 21 | 4 | Hex socket head cap screw | A193 B8M Class 2 | A4-70 | A193 B8M Class 2 | A4-70 |
| 40 | 2 | Seal ring | Graphite | Graphite | Graphite | Graphite |
| 41 | 1 | Wave spring | A286 | 1.4980 | A286 | 1.4980 |
| 42 | 1 | S-Ring | F51, A276 UNS S31803, A276 316L, A276 316Ti | 1.4462, 1.4404, 1.4571 | F51, A276 UNS S31803, A276 316L, A276 316Ti | 1.4462, 1.4404, 1.4571 |



| Item | Quantity | Description | Carbon Steel | | Stainless Steel | |
|------|----------|--------------|--------------|----------------|-----------------|----------------|
| | | | ASTM | DIN | ASTM | DIN |
| 16 | 2 | Parallel key | 316SS/316Ti | 1.4571, 1.4401 | 316SS/316Ti | 1.4571, 1.4401 |

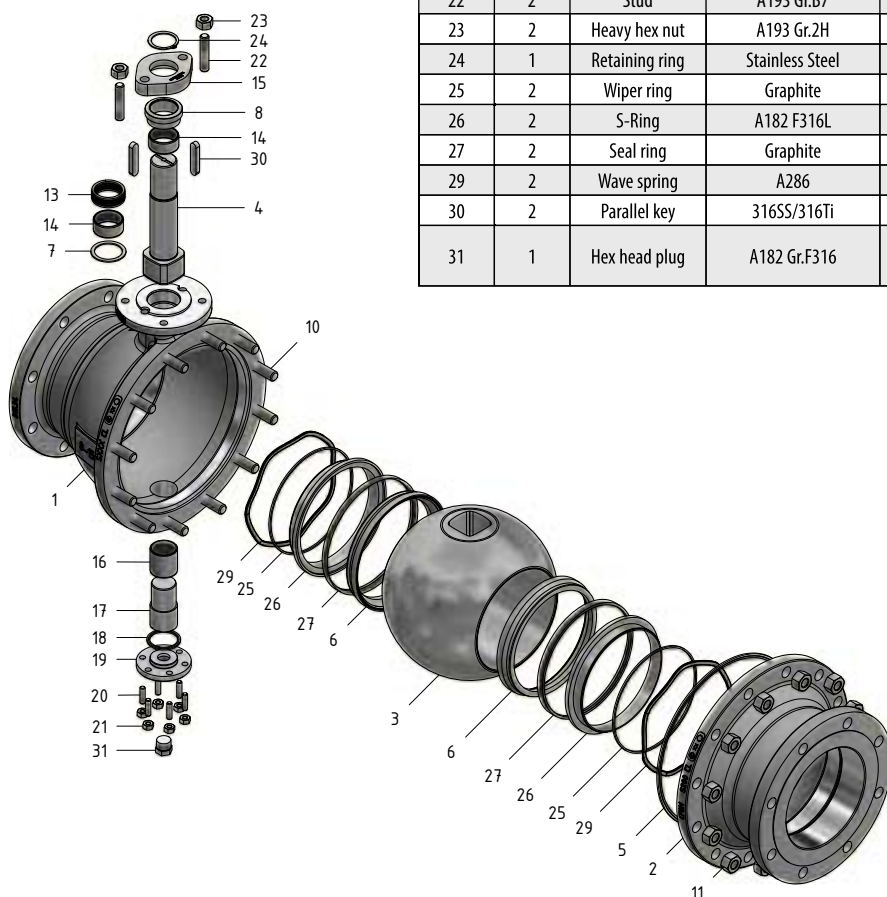
6" class 300 floating ball design with key connection item 16



Trunnion Design High Temperature Trim Class 150-300

Trunnion Design

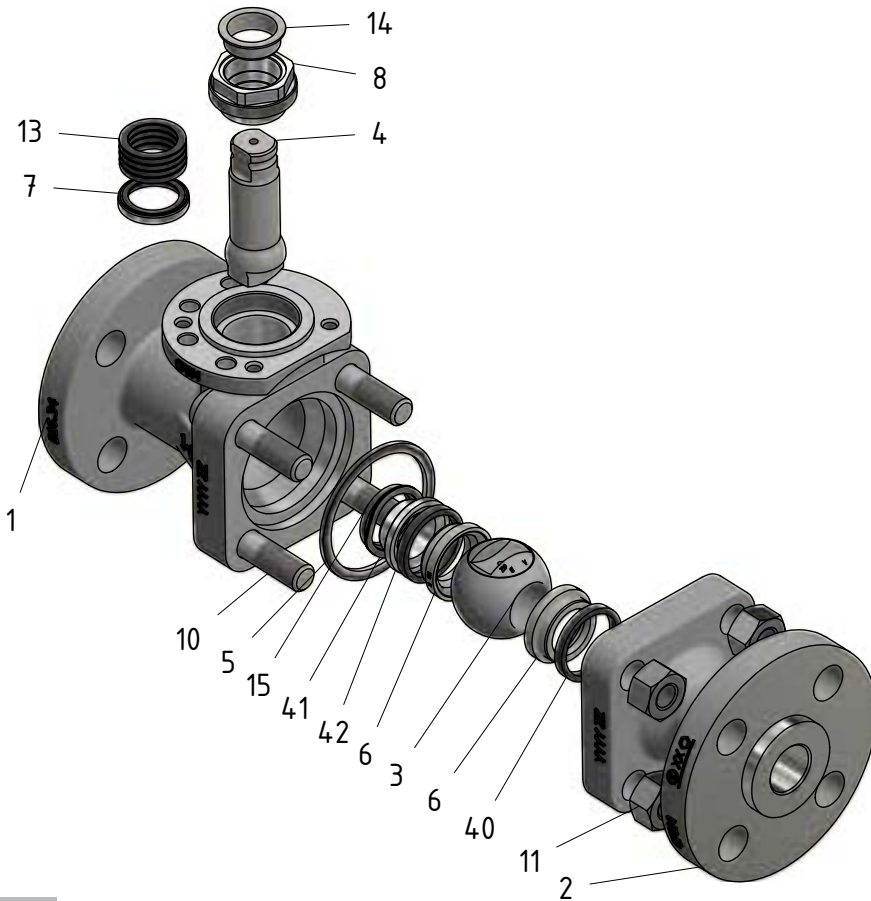
| Item | Quantity | Description | Carbon Steel | | Stainless Steel | |
|------|----------|----------------|----------------------|----------------------|----------------------|----------------------|
| | | | ASTM | DIN | ASTM | DIN |
| 1 | 1 | Body | A216 WCB | 1.0619 | A351 CF8M | 1.4408 |
| 2 | 1 | Tail | A216 WCB | 1.0619 | A351 CF8M | 1.4408 |
| 3 | 1 | Ball | A182 F316L+coating | 1.4404+coating | A182 F316L+coating | 1.4404+coating |
| 4 | 1 | Stem | A276 Gr.431 | 1.4057 | A276 Gr.431 | 1.4057 |
| 5 | 1 | Body gasket | PTFE/Graphite/316Ti | PTFE/Graphite/1.4571 | PTFE/Graphite/316Ti | PTFE/Graphite/1.4571 |
| 6 | 2 | Seat | A182 F316L+ coating | 1.4404+ coating | A182 F316L +coating | 1.4404 +coating |
| 7 | 1 | Thrust washer | Inconel 625+ coating | Inconel 625+ coating | Inconel 625+ coating | Inconel 625+ coating |
| 8 | 1 | Gland | A582 303 | 1.4305 | A582 303 | 1.4305 |
| 10 | 12 | Stud | A193 Gr.B7 | 1.7225 | A193 Gr.B8M Cl.2 | A4-70 |
| 11 | 12 | Heavy hex nut | A193 Gr.2H | 1.7225 | A194 Gr.8M | A4-70 |
| 13 | 1 | Packing set | Graphite | Graphite | Graphite | Graphite |
| 14 | 2 | Sleeve bearing | Inconel 625+ coating | Inconel 625+ coating | Inconel 625+ coating | Inconel 625+ coating |
| 15 | 1 | Gland flange | A516 Gr.70 | 1.0425 | A240 316Ti, 316SS | 1.4571, 1.4401 |
| 16 | 1 | Sleeve bearing | Inconel 625+coating | Inconel 625+coating | Inconel 625+coating | Inconel 625+coating |
| 17 | 1 | Bottom stem | A479 316Ti, 316SS | 1.4571, 1.4401 | A479 316Ti, 316SS | 1.4571, 1.4401 |
| 18 | 1 | Sealing | Graphite/316Ti | Graphite/316Ti | Graphite/316Ti | Graphite/316Ti |
| 19 | 1 | Cover | A479 316Ti, 316SS | 1.4571, 1.4401 | A479 316Ti, 316SS | 1.4571, 1.4401 |
| 20 | 6 | Stud | A193 Gr.B7 | 1.7225 | A193 Gr.B8M Cl.2 | A4-70 |
| 21 | 6 | Heavy hex nut | A193 Gr.2H | 1.7225 | A194 Gr.8M | A4-70 |
| 22 | 2 | Stud | A193 Gr.B7 | 1.7225 | A193 Gr.B8M Cl.2 | A4-70 |
| 23 | 2 | Heavy hex nut | A193 Gr.2H | 1.7225 | A194 Gr.8M | A4-70 |
| 24 | 1 | Retaining ring | Stainless Steel | 1.4122 | Stainless Steel | 1.4122 |
| 25 | 2 | Wiper ring | Graphite | Graphite | Graphite | Graphite |
| 26 | 2 | S-Ring | A182 F316L | 1.4404 | A182 F316L | 1.4404 |
| 27 | 2 | Seal ring | Graphite | Graphite | Graphite | Graphite |
| 29 | 2 | Wave spring | A286 | 1.4980 | A286 | 1.4980 |
| 30 | 2 | Parallel key | 316SS/316Ti | 1.4571, 1.4401 | 316SS/316Ti | 1.4571, 1.4401 |
| 31 | 1 | Hex head plug | A182 Gr.F316 | 1.4401 | A182 Gr.F316 | 1.4401 |



Floating Ball Design High Temperature Trim Class 600-900

Floating Ball Design

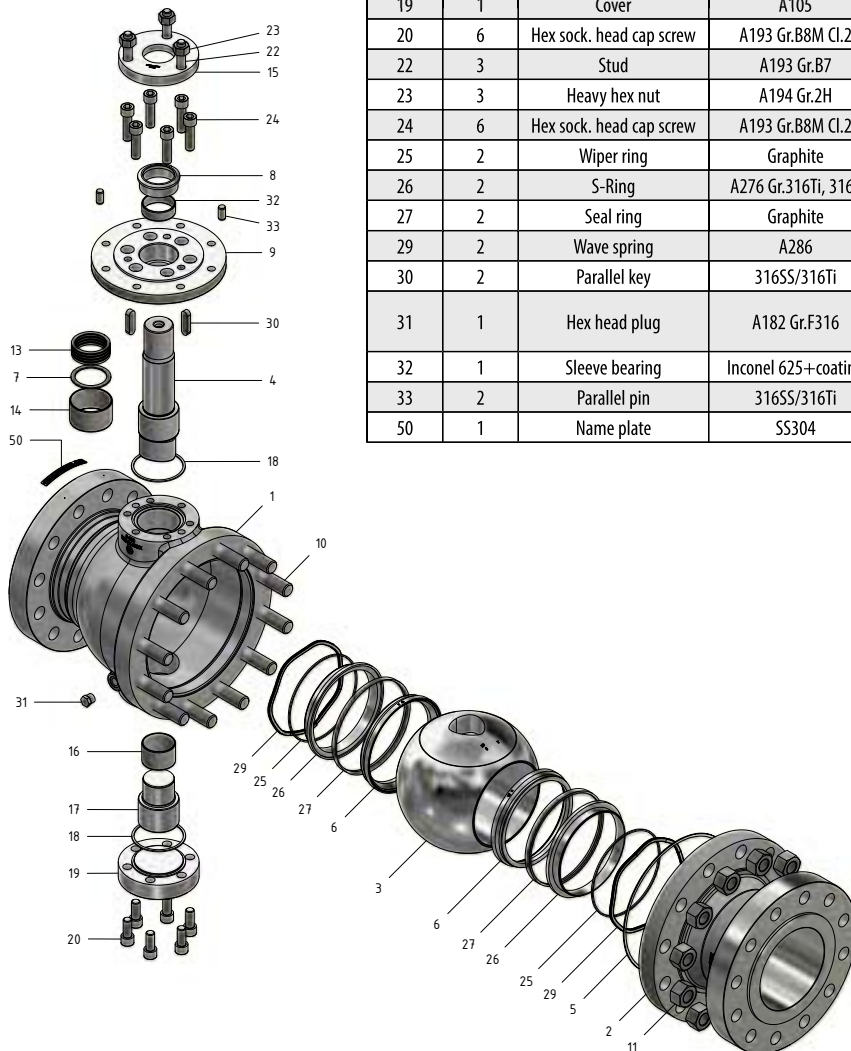
| Item | Quantity | Description | Carbon Steel | | Stainless Steel | |
|------|----------|---------------|---|------------------------|---|------------------------|
| | | | ASTM | DIN | ASTM | DIN |
| 1 | 1 | Body | A216 WCB | 1.0619 | A351 CF8M | 1.4408 |
| 2 | 1 | Tail | A216 WCB | 1.0619 | A351 CF8M | 1.4408 |
| 3 | 1 | Ball | A182 F316L+coating | 1.4404+coating | A182 F316L+coating | 1.4404+coating |
| 4 | 1 | Stem | A276 Gr.431 | 1.4057 | A276 Gr.431 | 1.4057 |
| 5 | 1 | Body gasket | Graphite/316Ti | Graphite/316Ti | Graphite/316Ti | Graphite/316Ti |
| 6 | 2 | Seat | A182 F316L+coating | 1.4404+coating | A182 F316L+coating | 1.4404+coating |
| 7 | 1 | S2 Stem Seal | e-Carbon | e-Carbon | e-Carbon | e-Carbon |
| 8 | 1 | Press nut | A479 316Ti, 316SS | 1.4571, 1.4401 | A479 316Ti, 316SS | 1.4571, 1.4401 |
| 10 | 4 | Stud | A193 Gr.B7 | 1.7225 | A193 Gr.B8M Cl.2 | A4-70 |
| 11 | 4 | Heavy hex nut | A194 Gr.2H | 1.7225 | A194 Gr.8M | A4-70 |
| 13 | 1 | Packing | Graphite | Graphite | Graphite | Graphite |
| 14 | 1 | Guide bushing | A582 303 coated | 1.4305 coated | A582 303 coated | 1.4305 coated |
| 15 | 1 | Wiper ring | Graphite | Graphite | Graphite | Graphite |
| 40 | 2 | Seal ring | Graphite | Graphite | Graphite | Graphite |
| 41 | 1 | Wave spring | A286 | 1.4980 | A286 | 1.4980 |
| 42 | 1 | S-Ring | F51, A276 UNS S31803, A276 316L, A276 316Ti | 1.4462, 1.4404, 1.4571 | F51, A276 UNS S31803, A276 316L, A276 316Ti | 1.4462, 1.4404, 1.4571 |



Trunnion Design High Temperature Trim Class 600-900

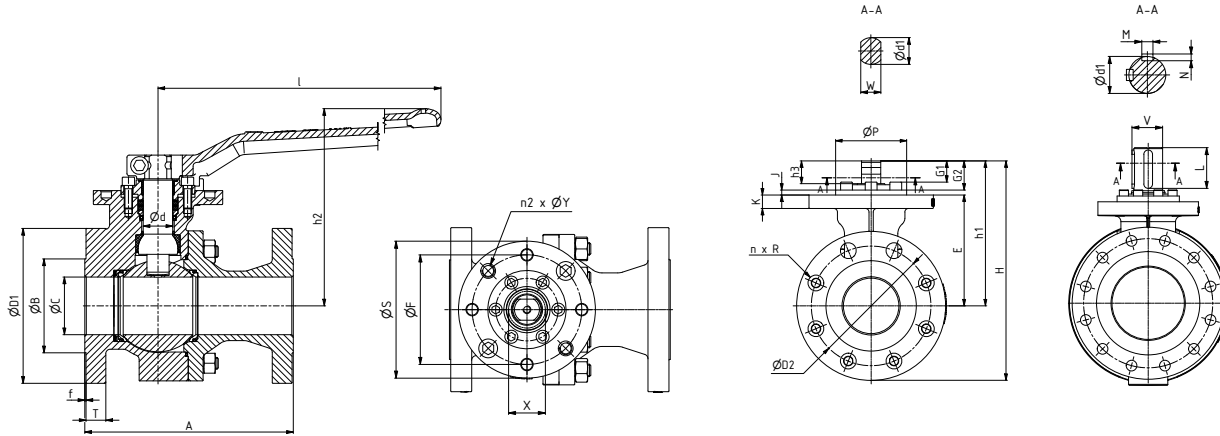
Trunnion Design

| Item | Quantity | Description | Carbon Steel | | Stainless Steel | |
|------|----------|--------------------------|--|-----------------------------------|--|-----------------------------------|
| | | | ASTM | DIN | ASTM | DIN |
| 1 | 1 | Body | A216 WCB | 1.0619 | A351 CF8M | 1.4408 |
| 2 | 1 | Tail | A216 WCB | 1.0619 | A351 CF8M | 1.4408 |
| 3 | 1 | Ball | A351 CF8M+coating, A182 F316L+coating | 1.4408+coating, 1.4404+coating | A351 CF8M+coating, A182 F316L+coating | 1.4408+coating, 1.4404+coating |
| 4 | 1 | Stem | A276 Gr.431 | 1.4057 | A276 Gr.431 | 1.4057 |
| 5 | 1 | Body gasket | Graphite | Graphite | Graphite | Graphite |
| 6 | 2 | Seat | A182 F316L+coating | 1.4404+coating | A182 F316L+coating | 1.4404+coating |
| 7 | 1 | Thrust Washer | Inconel 625+coating | Inconel 625+coating | Inconel 625+coating | Inconel 625+coating |
| 8 | 1 | Gland | A582 Gr.303 | 1.4305 | A582 Gr.303 | 1.4305 |
| 9 | 1 | Bonnet | A216 WCB | 1.0619 | A351 CF8M | 1.4408 |
| 10 | 12 | Stud | A193 Gr.B7 | 1.7225 | A193 Gr.B8M Cl.2 | A4-70 |
| 11 | 12 | Heavy hex nut | A194 Gr.2H | 1.7225 | A194 Gr.8M | A4-70 |
| 13 | 1 | Packing | Graphite | Graphite | Graphite | Graphite |
| 14 | 1 | Sleeve bearing | Inconel 625+coating | Inconel 625+coating | Inconel 625+coating | Inconel 625+coating |
| 15 | 1 | Gland flange | A516 Gr.70 | 1.0425 | A479 316Ti, 316SS | 1.4571, 1.4401 |
| 16 | 1 | Sleeve bearing | Inconel 625+coating | Inconel 625+coating | Inconel 625+coating | Inconel 625+coating |
| 17 | 1 | Trunnion | A479 316Ti, 316SS | 1.4571, 1.4401 | A479 316Ti, 316SS | 1.4571, 1.4401 |
| 18 | 2 | Body gasket | Graphite | Graphite | Graphite | Graphite |
| 19 | 1 | Cover | A105 | 1.0460 | A479 316Ti; 316SS | 1.4571, 1.4401 |
| 20 | 6 | Hex sock. head cap screw | A193 Gr.B8M Cl.2 | 1.7225 | A193 Gr.B8M Cl.2 | A193 Gr.B8M Cl.2 |
| 22 | 3 | Stud | A193 Gr.B7 | 1.7225 | A193 Gr.B8M Cl.2 | A193 Gr.B8M Cl.2 |
| 23 | 3 | Heavy hex nut | A194 Gr.2H | 1.7225 | A194 Gr.8M | A4-70 |
| 24 | 6 | Hex sock. head cap screw | A193 Gr.B8M Cl.2 | 1.7225 | A193 Gr.B8M Cl.2 | A193 Gr.B8M Cl.2 |
| 25 | 2 | Wiper ring | Graphite | Graphite | Graphite | Graphite |
| 26 | 2 | S-Ring | A276 Gr.316Ti, 316L | 1.4571, 1.4404 | A276 Gr.316Ti, 316L | 1.4571, 1.4404 |
| 27 | 2 | Seal ring | Graphite | Graphite | Graphite | Graphite |
| 29 | 2 | Wave spring | A286 | 1.4980 | A286 | 1.4980 |
| 30 | 2 | Parallel key | 316SS/316Ti | 1.4571, 1.4401 | 316SS/316Ti | 1.4571, 1.4401 |
| 31 | 1 | Hex head plug | A182 Gr.F316 | 1.4401 | A182 Gr.F316 | 1.4401 |
| 32 | 1 | Sleeve bearing | Inconel 625+coating | Inconel 625+coating | Inconel 625+coating | Inconel 625+coating |
| 33 | 2 | Parallel pin | 316SS/316Ti | 1.4571, 1.4401 | 316SS/316Ti | 1.4571, 1.4401 |
| 50 | 1 | Name plate | SS304 | 1.4301 | SS304 | 1.4301 |



Floating Ball Design

Dimensions and Weights Class 150



Dimensions D1, L, h2, S, E, h1 and H are for reference only.

| DN | NPS | Dimensions (inch) | | | | | | | | | | | | | | Weights (lb) |
|-----|--------|-------------------|-----------------|-------|-------|------|------------------|------------------|---|------|-----------------|------|------|-------|-------|--------------|
| | | A | $\varnothing C$ | H | h1 | E | $\varnothing D1$ | $\varnothing D2$ | n | R | $\varnothing B$ | T | f | h2 | I | |
| 15 | 1/2" | 4.25 | 0.51 | 5.61 | 2.72 | 1.93 | 3.50 | 2.38 | 4 | 0.62 | 1.38 | 0.38 | 0.06 | 3.86 | 7.17 | 5 |
| 20 | 3/4" | 4.61 | 0.75 | 6.04 | 2.95 | 2.17 | 3.88 | 2.75 | 4 | 0.62 | 1.69 | 0.44 | 0.06 | 4.09 | 7.17 | 6 |
| 25 | 1" | 5.00 | 0.98 | 6.34 | 3.07 | 2.28 | 4.25 | 3.12 | 4 | 0.62 | 2.00 | 0.50 | 0.06 | 4.21 | 7.17 | 8 |
| 40 | 1 1/2" | 6.50 | 1.50 | 8.44 | 4.37 | 3.27 | 5.00 | 3.88 | 4 | 0.62 | 2.88 | 0.63 | 0.06 | 5.94 | 11.02 | 17 |
| 50 | 2" | 7.00 | 1.93 | 9.22 | 4.65 | 3.54 | 6.00 | 4.75 | 4 | 0.75 | 3.62 | 0.69 | 0.06 | 6.22 | 13.50 | 23 |
| 80 | 3" | 8.00 | 3.07 | 12.49 | 6.50 | 5.00 | 7.50 | 6.00 | 4 | 0.75 | 5.00 | 0.88 | 0.06 | 8.74 | 17.72 | 50 |
| 100 | 4" | 9.00 | 3.94 | 15.44 | 8.46 | 6.57 | 9.00 | 7.50 | 8 | 0.75 | 6.19 | 0.88 | 0.06 | 10.94 | 28.35 | 83 |
| 150 | 6" | 15.50 | 5.94 | 17.05 | 10.39 | 8.35 | 11.00 | 9.50 | 8 | 0.88 | 8.50 | 0.94 | 0.06 | - | - | 214 |

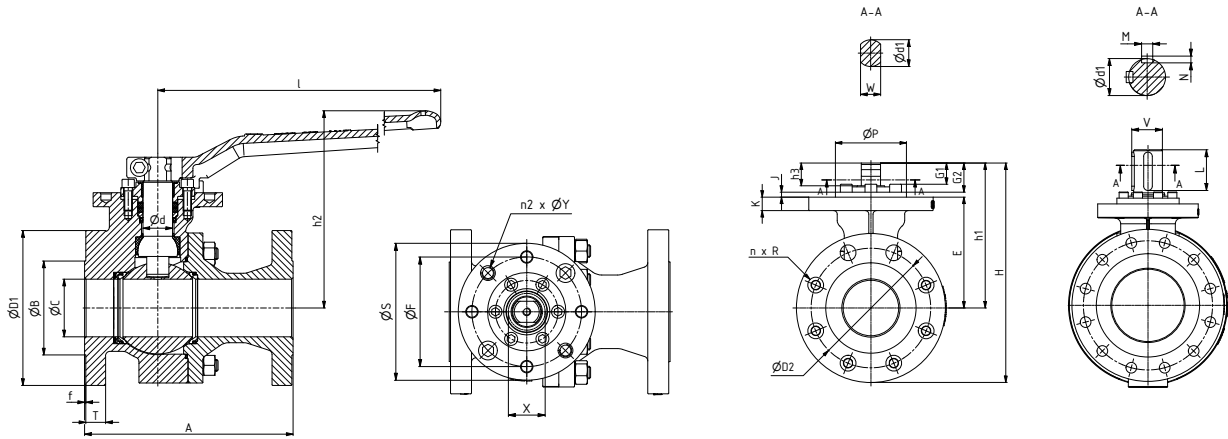
| DN | NPS | Dimensions (inch) | | | | | | | | | | | | | | |
|-----|--------|-------------------|-----------------|-----------------|-----------------|----|-----------------|------|------|-----------------|---|---|---|------|------|------------------|
| | | ISO 5211 | $\varnothing S$ | $\varnothing P$ | $\varnothing F$ | n2 | $\varnothing Y$ | K | J | $\varnothing d$ | L | M | N | h3 | W | $\varnothing d1$ |
| 15 | 1/2" | F05 | 2.56 | 1.38 | 1.97 | 4 | M6 | 0.39 | 0.08 | 0.63 | - | - | - | 0.51 | 0.43 | 0.55 |
| 20 | 3/4" | F05 | 2.56 | 1.38 | 1.97 | 4 | M6 | 0.43 | 0.08 | 0.63 | - | - | - | 0.51 | 0.43 | 0.55 |
| 25 | 1" | F05 | 2.56 | 1.38 | 1.97 | 4 | M6 | 0.35 | 0.08 | 0.63 | - | - | - | 0.51 | 0.43 | 0.55 |
| 40 | 1 1/2" | F07 | 3.54 | 2.17 | 2.76 | 4 | M8 | 0.35 | 0.12 | 0.79 | - | - | - | 0.79 | 0.55 | 0.71 |
| 50 | 2" | F07 | 3.54 | 2.17 | 2.76 | 4 | M8 | 0.39 | 0.12 | 0.79 | - | - | - | 0.79 | 0.55 | 0.71 |
| 80 | 3" | F10 | 4.92 | 2.76 | 4.02 | 4 | M10 | 0.85 | 0.12 | 1.10 | - | - | - | 1.02 | 0.75 | 0.98 |
| 100 | 4" | F14 | 6.89 | 3.94 | 5.51 | 4 | M16 | 0.71 | 0.24 | 1.57 | - | - | - | 1.32 | 1.06 | 1.42 |
| 150 | 6" | F14 | 6.89 | 3.94 | 5.51 | 4 | M16 | 0.87 | 0.24 | 1.97 | - | - | - | 1.57 | 1.42 | 1.89 |

| DN | NPS | Dimensions (mm) | | | | | | | | | | | | | | Weights (kg) |
|-----|--------|-----------------|-----------------|-----|-----|-----|------------------|------------------|---|------|-----------------|------|-----|-----|-----|--------------|
| | | A | $\varnothing C$ | H | h1 | E | $\varnothing D1$ | $\varnothing D2$ | n | R | $\varnothing B$ | T | f | h2 | I | |
| 15 | 1/2" | 108 | 13 | 143 | 69 | 49 | 89.0 | 60.5 | 4 | 15.8 | 35.0 | 9.7 | 1.6 | 98 | 182 | 2.3 |
| 20 | 3/4" | 117 | 19 | 153 | 75 | 55 | 98.6 | 69.9 | 4 | 15.8 | 43.0 | 11.1 | 1.6 | 104 | 182 | 2.9 |
| 25 | 1" | 127 | 25 | 161 | 78 | 58 | 108.0 | 79.2 | 4 | 15.8 | 50.8 | 12.7 | 1.6 | 107 | 182 | 3.5 |
| 40 | 1 1/2" | 165 | 38 | 215 | 111 | 83 | 127.0 | 98.6 | 4 | 15.8 | 73.2 | 15.9 | 1.6 | 151 | 280 | 7.8 |
| 50 | 2" | 178 | 49 | 234 | 118 | 90 | 152.4 | 120.7 | 4 | 19.0 | 92.0 | 17.5 | 1.6 | 158 | 343 | 10.6 |
| 80 | 3" | 203 | 78 | 317 | 165 | 127 | 190.5 | 152.0 | 4 | 19.0 | 127.0 | 22.3 | 1.6 | 222 | 450 | 22.6 |
| 100 | 4" | 229 | 100 | 392 | 215 | 167 | 228.6 | 190.5 | 8 | 19.0 | 157.2 | 22.3 | 1.6 | 278 | 720 | 37.6 |
| 150 | 6" | 394 | 151 | 433 | 264 | 212 | 279.4 | 241.3 | 8 | 22.2 | 215.9 | 23.8 | 1.6 | - | - | 96.9 |

| DN | NPS | Dimensions (mm) | | | | | | | | | | | | | | |
|-----|--------|-----------------|-----------------|-----------------|-----------------|----|-----------------|------|---|-----------------|---|---|---|------|----|------------------|
| | | ISO 5211 | $\varnothing S$ | $\varnothing P$ | $\varnothing F$ | n2 | $\varnothing Y$ | K | J | $\varnothing d$ | L | M | N | h3 | W | $\varnothing d1$ |
| 15 | 1/2" | F05 | 65 | 35 | 50 | 4 | M6 | 10.0 | 2 | 16 | - | - | - | 13.0 | 11 | 14 |
| 20 | 3/4" | F05 | 65 | 35 | 50 | 4 | M6 | 11.0 | 2 | 16 | - | - | - | 13.0 | 11 | 14 |
| 25 | 1" | F05 | 65 | 35 | 50 | 4 | M6 | 9.0 | 2 | 16 | - | - | - | 13.0 | 11 | 14 |
| 40 | 1 1/2" | F07 | 90 | 55 | 70 | 4 | M8 | 9.0 | 3 | 20 | - | - | - | 20.0 | 14 | 18 |
| 50 | 2" | F07 | 90 | 55 | 70 | 4 | M8 | 10.0 | 3 | 20 | - | - | - | 20.0 | 14 | 18 |
| 80 | 3" | F10 | 125 | 70 | 102 | 4 | M10 | 21.5 | 3 | 28 | - | - | - | 26.0 | 19 | 25 |
| 100 | 4" | F14 | 175 | 100 | 140 | 4 | M16 | 18.0 | 6 | 40 | - | - | - | 33.5 | 27 | 36 |
| 150 | 6" | F14 | 175 | 100 | 140 | 4 | M16 | 22.0 | 6 | 50 | - | - | - | 40.0 | 36 | 48 |

Floating Ball Design

Dimensions and Weights Class 300



Dimensions D1, L, h2, S, E, h1 and H are for reference only.

| DN | NPS | Dimensions (inch) | | | | | | | | | | | | | | Weights (lb) |
|-----|--------|-------------------|------|-------|-------|------|-------|-------|----|------|------|------|------|-------|-------|--------------|
| | | A | ØC | H | h1 | E | ØD1 | ØD2 | n | R | ØB | T | f | h2 | l | |
| 15 | 1/2" | 5.50 | 0.51 | 5.73 | 2.72 | 1.93 | 3.75 | 2.62 | 4 | 0.62 | 1.38 | 0.50 | 0.06 | 3.86 | 7.17 | 7 |
| 20 | 3/4" | 6.00 | 0.75 | 6.40 | 2.95 | 2.17 | 4.62 | 3.25 | 4 | 0.75 | 1.69 | 0.56 | 0.06 | 4.09 | 7.17 | 10 |
| 25 | 1" | 6.50 | 0.98 | 6.65 | 3.07 | 2.28 | 4.88 | 3.50 | 4 | 0.75 | 2.00 | 0.62 | 0.06 | 4.21 | 7.17 | 11 |
| 40 | 1 1/2" | 7.50 | 1.50 | 9.00 | 4.37 | 3.27 | 6.12 | 4.50 | 4 | 0.87 | 2.88 | 0.75 | 0.06 | 5.94 | 13.50 | 24 |
| 50 | 2" | 8.50 | 1.93 | 11.32 | 5.79 | 4.29 | 6.50 | 5.00 | 8 | 0.75 | 3.62 | 0.81 | 0.06 | 8.07 | 17.72 | 35 |
| 80 | 3" | 11.13 | 3.07 | 14.56 | 8.03 | 6.14 | 8.25 | 6.62 | 8 | 0.87 | 5.00 | 1.06 | 0.06 | 10.43 | 28.35 | 76 |
| 100 | 4" | 12.00 | 3.94 | 13.78 | 8.78 | 6.73 | 10.00 | 7.88 | 8 | 0.87 | 6.19 | 1.19 | 0.06 | - | - | 124 |
| 150 | 6" | 15.88 | 5.94 | 19.53 | 12.80 | 8.35 | 12.50 | 10.62 | 12 | 0.88 | 8.50 | 1.38 | 0.06 | - | - | 301 |

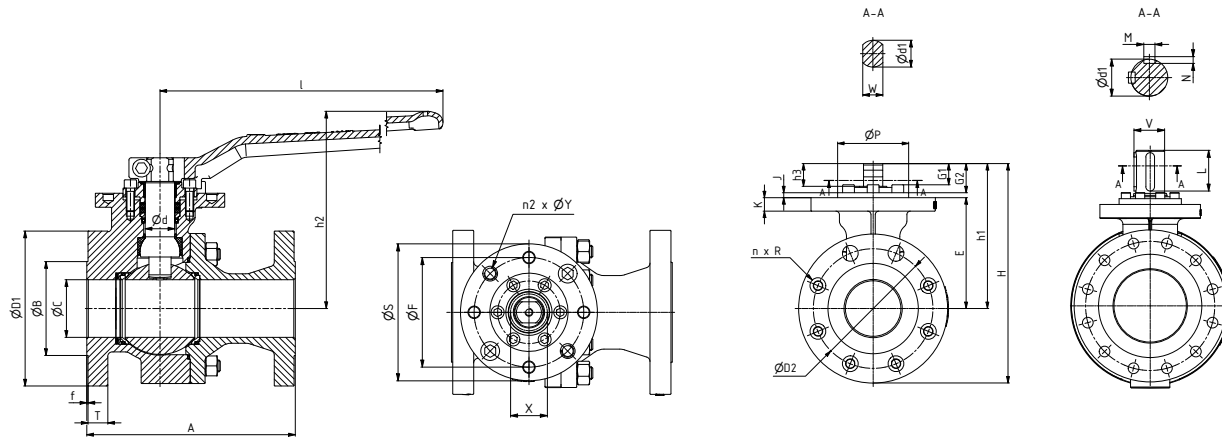
| DN | NPS | Dimensions (inch) | | | | | | | | | | | | | | |
|-----|--------|-------------------|------|------|------|----|-----|------|------|------|------|------|------|------|------|------|
| | | ISO 5211 | ØS | ØP | ØF | n2 | ØY | K | J | Ød | L | M | N | h3 | W | Ød1 |
| 15 | 1/2" | F05 | 2.56 | 1.38 | 1.97 | 4 | M6 | 0.39 | 0.08 | 0.63 | - | - | - | 0.51 | 0.43 | 0.55 |
| 20 | 3/4" | F05 | 2.56 | 1.38 | 1.97 | 4 | M6 | 0.43 | 0.08 | 0.63 | - | - | - | 0.51 | 0.43 | 0.55 |
| 25 | 1" | F05 | 2.56 | 1.38 | 1.97 | 4 | M6 | 0.35 | 0.08 | 0.63 | - | - | - | 0.51 | 0.43 | 0.55 |
| 40 | 1 1/2" | F07 | 3.54 | 2.17 | 2.76 | 4 | M8 | 0.35 | 0.12 | 0.79 | - | - | - | 0.79 | 0.55 | 0.71 |
| 50 | 2" | F10 | 4.92 | 2.76 | 4.02 | 4 | M10 | 0.67 | 0.12 | 1.10 | - | - | - | 1.02 | 0.75 | 0.98 |
| 80 | 3" | F14 | 6.89 | 3.94 | 5.51 | 4 | M16 | 0.75 | 0.24 | 1.57 | - | - | - | 1.32 | 1.06 | 1.42 |
| 100 | 4" | F14 | 6.89 | 3.94 | 5.51 | 4 | M16 | 0.94 | 0.24 | 1.97 | - | - | - | 1.57 | 1.42 | 1.89 |
| 150 | 6" | F16 | 8.27 | 5.12 | 6.50 | 4 | M20 | 1.14 | 0.28 | 2.76 | 3.15 | 0.71 | 0.43 | - | - | - |

| DN | NPS | Dimensions (mm) | | | | | | | | | | | | | | Weights (kg) |
|-----|--------|-----------------|-----|-----|-----|-----|-------|-------|----|------|-------|------|-----|-----|-----|--------------|
| | | A | ØC | H | h1 | E | ØD1 | ØD2 | n | R | ØB | T | f | h2 | l | |
| 15 | 1/2" | 140 | 13 | 146 | 69 | 49 | 95.2 | 66.5 | 4 | 15.8 | 35.0 | 12.7 | 1.6 | 98 | 182 | 3.2 |
| 20 | 3/4" | 152 | 19 | 163 | 75 | 55 | 117.3 | 82.6 | 4 | 19.0 | 43.0 | 14.1 | 1.6 | 104 | 182 | 4.5 |
| 25 | 1" | 165 | 25 | 169 | 78 | 58 | 124.0 | 88.9 | 4 | 19.0 | 50.8 | 15.8 | 1.6 | 107 | 182 | 5.1 |
| 40 | 1 1/2" | 190 | 38 | 229 | 111 | 83 | 155.4 | 114.3 | 4 | 22.2 | 73.2 | 19.1 | 1.6 | 151 | 343 | 11.0 |
| 50 | 2" | 216 | 49 | 288 | 147 | 109 | 165.0 | 127.0 | 8 | 19.0 | 92.0 | 20.7 | 1.6 | 205 | 450 | 15.9 |
| 80 | 3" | 282 | 78 | 370 | 204 | 156 | 209.6 | 168.2 | 8 | 22.2 | 127.0 | 26.8 | 1.6 | 265 | 720 | 34.5 |
| 100 | 4" | 305 | 100 | 350 | 223 | 171 | 254.0 | 200.2 | 8 | 22.2 | 157.2 | 30.2 | 1.6 | - | - | 56.3 |
| 150 | 6" | 403 | 151 | 496 | 325 | 212 | 317.5 | 269.7 | 12 | 22.2 | 215.9 | 35.0 | 1.6 | - | - | 136.6 |

| DN | NPS | Dimensions (mm) | | | | | | | | | | | | | | |
|-----|--------|-----------------|-----|-----|-----|----|-----|----|---|----|----|----|----|------|----|-----|
| | | ISO 5211 | ØS | ØP | ØF | n2 | ØY | K | J | Ød | L | M | N | h3 | W | Ød1 |
| 15 | 1/2" | F05 | 65 | 35 | 50 | 4 | M6 | 10 | 2 | 16 | - | - | - | 13.0 | 11 | 14 |
| 20 | 3/4" | F05 | 65 | 35 | 50 | 4 | M6 | 11 | 2 | 16 | - | - | - | 13.0 | 11 | 14 |
| 25 | 1" | F05 | 65 | 35 | 50 | 4 | M6 | 9 | 2 | 16 | - | - | - | 13.0 | 11 | 14 |
| 40 | 1 1/2" | F07 | 90 | 55 | 70 | 4 | M8 | 9 | 3 | 20 | - | - | - | 20.0 | 14 | 18 |
| 50 | 2" | F10 | 125 | 70 | 102 | 4 | M10 | 17 | 3 | 28 | - | - | - | 26.0 | 19 | 25 |
| 80 | 3" | F14 | 175 | 100 | 140 | 4 | M16 | 19 | 6 | 40 | - | - | - | 33.5 | 27 | 36 |
| 100 | 4" | F14 | 175 | 100 | 140 | 4 | M16 | 24 | 6 | 50 | - | - | - | 40.0 | 36 | 48 |
| 150 | 6" | F16 | 210 | 130 | 165 | 4 | M20 | 29 | 7 | 70 | 80 | 18 | 11 | - | - | - |

Floating Ball Design

Dimensions and Weights Class 600



Dimensions D1, L, h2, S, E, h1 and H are for reference only.

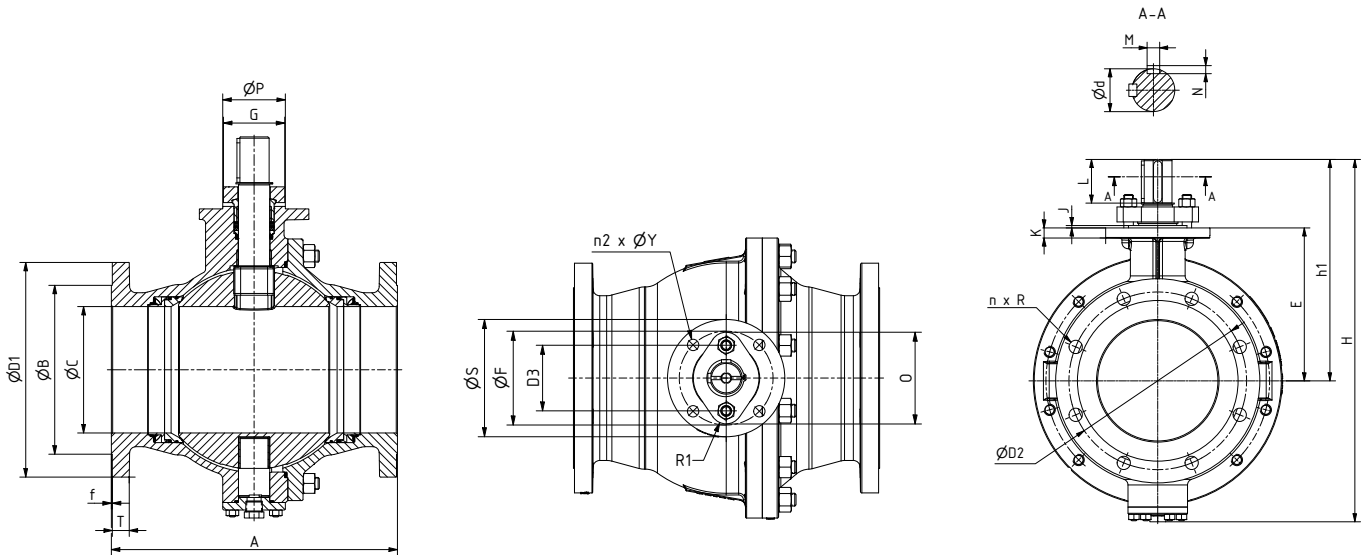
| DN | NPS | Dimensions (inch) | | | | | | | | | | | | | | Weights (lb) |
|----|--------|-------------------|-----------------|------|------|------|------------------|------------------|---|------|-----------------|------|------|------|-------|--------------|
| | | A | $\varnothing C$ | H | h1 | E | $\varnothing D1$ | $\varnothing D2$ | n | R | $\varnothing B$ | T | f | h2 | l | |
| 15 | 1/2" | 6.50 | 0.51 | 4.59 | 2.72 | 1.95 | 3.75 | 2.62 | 4 | 0.63 | 1.37 | 0.56 | 0.25 | 3.86 | 7.17 | 10 |
| 20 | 3/4" | 7.50 | 0.75 | 5.67 | 3.41 | 2.52 | 4.62 | 3.25 | 4 | 0.75 | 1.69 | 0.62 | 0.25 | 5.75 | 11.02 | 17 |
| 25 | 1" | 8.50 | 0.98 | 6.18 | 3.72 | 2.64 | 4.88 | 3.50 | 4 | 0.75 | 2.00 | 0.69 | 0.25 | 6.06 | 13.50 | 20 |
| 40 | 1 1/2" | 9.50 | 1.50 | 8.33 | 5.28 | 3.78 | 6.12 | 4.50 | 4 | 0.87 | 2.87 | 0.88 | 0.25 | 7.56 | 17.72 | 42 |

| DN | NPS | Dimensions (inch) | | | | | | | | | | | | | | |
|----|--------|-------------------|-----------------|-----------------|-----------------|----|-----------------|------|------|-----------------|---|---|---|------|------|------------------|
| | | ISO 5211 | $\varnothing S$ | $\varnothing P$ | $\varnothing F$ | n2 | $\varnothing Y$ | K | J | $\varnothing d$ | L | M | N | h3 | W | $\varnothing d1$ |
| 15 | 1/2" | F05 | 2.56 | 1.38 | 1.97 | 4 | M6 | 0.57 | 0.08 | 0.63 | - | - | - | 0.47 | 0.43 | 0.55 |
| 20 | 3/4" | F05 | 2.56 | 1.38 | 1.97 | 4 | M6 | 0.83 | 0.12 | 0.79 | - | - | - | 0.55 | 0.55 | 0.71 |
| 25 | 1" | F07 | 3.54 | 2.17 | 2.76 | 4 | M8 | 0.39 | 0.12 | 0.94 | - | - | - | 0.63 | 0.67 | 0.87 |
| 40 | 1 1/2" | F10 | 4.92 | 2.76 | 4.02 | 4 | M10 | 0.67 | 0.12 | 1.10 | - | - | - | 0.98 | 0.75 | 0.98 |

| DN | NPS | Dimensions (mm) | | | | | | | | | | | | | | Weights (kg) |
|----|--------|-----------------|-----------------|-----|-------|------|------------------|------------------|---|----|-----------------|------|---|-----|-----|--------------|
| | | A | $\varnothing C$ | H | h1 | E | $\varnothing D1$ | $\varnothing D2$ | n | R | $\varnothing B$ | T | f | h2 | l | |
| 15 | 1/2" | 165 | 13 | 117 | 69.0 | 49.5 | 95 | 66.7 | 4 | 16 | 34.9 | 15.0 | 7 | 98 | 182 | 4.7 |
| 20 | 3/4" | 190 | 19 | 144 | 86.5 | 64.0 | 115 | 82.6 | 4 | 19 | 42.9 | 16.5 | 7 | 146 | 280 | 7.6 |
| 25 | 1" | 216 | 25 | 157 | 94.5 | 67.0 | 125 | 88.9 | 4 | 19 | 50.8 | 17.5 | 7 | 154 | 343 | 8.9 |
| 40 | 1 1/2" | 241 | 38 | 212 | 134.0 | 96.0 | 155 | 114.3 | 4 | 22 | 73.0 | 23.5 | 7 | 192 | 450 | 19.0 |

| DN | NPS | Dimensions (mm) | | | | | | | | | | | | | | |
|----|--------|-----------------|-----------------|-----------------|-----------------|----|-----------------|------|---|-----------------|---|---|---|----|----|------------------|
| | | ISO 5211 | $\varnothing S$ | $\varnothing P$ | $\varnothing F$ | n2 | $\varnothing Y$ | K | J | $\varnothing d$ | L | M | N | h3 | W | $\varnothing d1$ |
| 15 | 1/2" | F05 | 65 | 35 | 50 | 4 | M6 | 14.5 | 2 | 16 | - | - | - | 12 | 11 | 14 |
| 20 | 3/4" | F05 | 65 | 35 | 50 | 4 | M6 | 21.0 | 3 | 20 | - | - | - | 14 | 14 | 18 |
| 25 | 1" | F07 | 90 | 55 | 70 | 4 | M8 | 10.0 | 3 | 24 | - | - | - | 16 | 17 | 22 |
| 40 | 1 1/2" | F10 | 125 | 70 | 102 | 4 | M10 | 17.0 | 3 | 28 | - | - | - | 25 | 19 | 25 |

Trunnion Design Dimensions and Weights Class 150



Dimensions D1, L, S, E, h1 and H are for reference only.

| DN | NPS | Dimensions (inch) | | | | | | | | | | | | | | | Weights (lb) | |
|-----|-----|-------------------|-------|-------|-------|-------|-------|-------|----|------|-------|------|------|------|------|------|--------------|------|
| | | A | ØC | H | h1 | E | ØD1 | ØD2 | n | R | ØB | T | f | O | G | D3 | | R1 |
| 200 | 8" | 18.00 | 7.95 | 23.46 | 14.57 | 10.12 | 13.50 | 11.75 | 8 | 0.88 | 10.62 | 1.06 | 0.06 | 5.08 | 3.82 | 3.86 | 0.79 | 377 |
| 250 | 10" | 21.00 | 9.92 | 26.65 | 16.26 | 11.81 | 16.00 | 14.25 | 12 | 1.00 | 12.75 | 1.12 | 0.06 | 5.08 | 3.82 | 3.86 | 0.79 | 620 |
| 300 | 12" | 24.00 | 11.93 | 31.85 | 19.04 | 13.19 | 19.00 | 17.00 | 12 | 1.00 | 15.00 | 1.19 | 0.06 | 7.01 | 4.02 | 5.12 | 0.94 | 1017 |

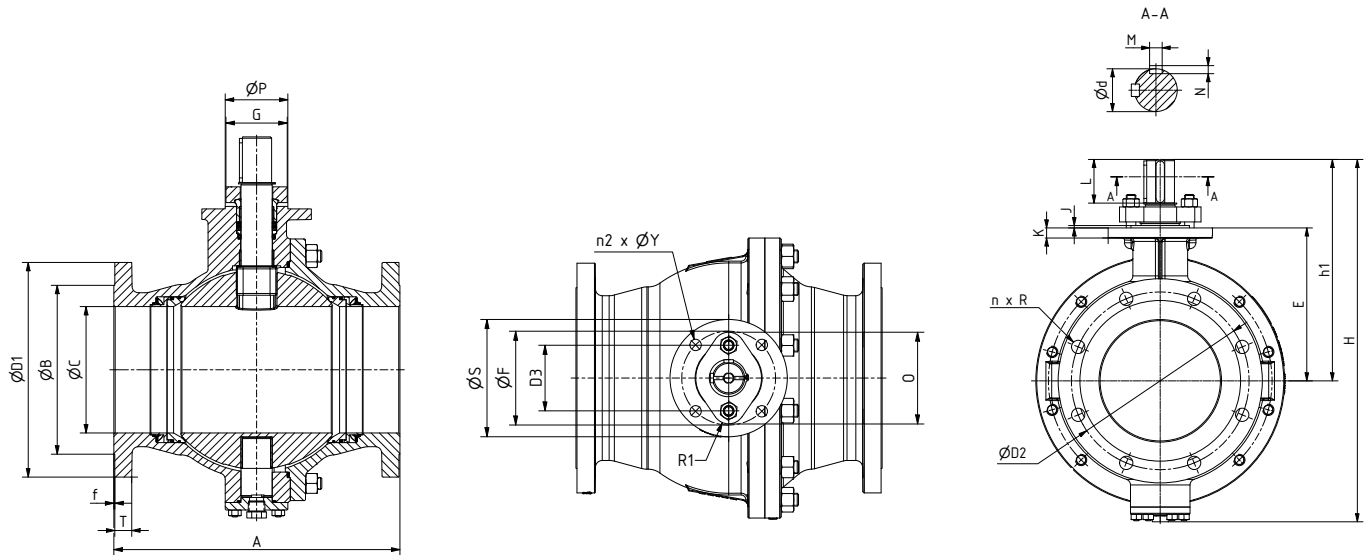
| DN | NPS | Dimensions (inch) | | | | | | | | | | | |
|-----|-----|-------------------|------|------|------|----|------|------|------|------|------|------|------|
| | | ISO 5211 | ØS | ØP | ØF | n2 | ØY | K | J | Ød | L | M | N |
| 200 | 8" | F14 | 6.89 | 3.94 | 5.51 | 4 | 0.67 | 0.67 | 0.16 | 1.89 | 2.76 | 0.55 | 0.35 |
| 250 | 10" | F14 | 6.89 | 3.94 | 5.51 | 4 | 0.67 | 0.87 | 0.16 | 1.89 | 2.76 | 0.55 | 0.35 |
| 300 | 12" | F16 | 8.27 | 5.12 | 6.50 | 4 | 0.83 | 0.83 | 0.20 | 2.36 | 3.94 | 0.71 | 0.43 |

| DN | NPS | Dimensions (mm) | | | | | | | | | | | | | | | Weights (kg) | |
|-----|-----|-----------------|-----|-----|-------|-----|-------|-------|----|------|-------|------|-----|-----|-----|-----|--------------|-------|
| | | A | ØC | H | h1 | E | ØD1 | ØD2 | n | R | ØB | T | f | O | G | D3 | | R1 |
| 200 | 8" | 457 | 202 | 596 | 370 | 257 | 343.0 | 298.4 | 8 | 22.2 | 269.8 | 26.9 | 1.6 | 129 | 97 | 98 | 20 | 171.2 |
| 250 | 10" | 533 | 252 | 677 | 413 | 300 | 406.4 | 362.0 | 12 | 25.4 | 323.8 | 28.6 | 1.6 | 129 | 97 | 98 | 20 | 281.1 |
| 300 | 12" | 610 | 303 | 809 | 483.5 | 335 | 482.6 | 431.8 | 12 | 25.4 | 381.0 | 30.2 | 1.6 | 178 | 102 | 130 | 24 | 461.1 |

| DN | NPS | Dimensions (mm) | | | | | | | | | | | |
|-----|-----|-----------------|-----|-----|-----|----|-----|----|---|----|-----|----|----|
| | | ISO 5211 | ØS | ØP | ØF | n2 | ØY | K | J | Ød | L | M | N |
| 200 | 8" | F14 | 175 | 100 | 140 | 4 | Ø17 | 17 | 4 | 48 | 70 | 14 | 9 |
| 250 | 10" | F14 | 175 | 100 | 140 | 4 | Ø17 | 22 | 4 | 48 | 70 | 14 | 9 |
| 300 | 12" | F16 | 210 | 130 | 165 | 4 | Ø21 | 21 | 5 | 60 | 100 | 18 | 11 |

Trunnion Design

Dimensions and Weights Class 300



Dimensions D1, L, S, E, h1 and H are for reference only.

| DN | NPS | Dimensions (inch) | | | | | | | | | | | | | | | | Weights (lb) |
|-----|-----|-------------------|-------|-------|-------|-------|-------|-------|----|------|-------|------|------|------|------|------|------|--------------|
| | | A | ØC | H | h1 | E | ØD1 | ØD2 | n | R | ØB | T | f | O | G | D3 | R1 | |
| 200 | 8" | 19.75 | 7.95 | 23.98 | 14.72 | 10.08 | 15.00 | 13.00 | 12 | 1.00 | 10.62 | 1.56 | 0.06 | 7.17 | 5.04 | 5.12 | 0.94 | 517 |
| 250 | 10" | 22.38 | 9.92 | 28.19 | 17.44 | 11.42 | 17.50 | 15.25 | 16 | 1.13 | 12.75 | 1.81 | 0.06 | 7.17 | 5.04 | 5.12 | 0.94 | 914 |
| 300 | 12" | 25.50 | 11.93 | 32.44 | 19.59 | 13.19 | 20.50 | 17.75 | 16 | 1.25 | 15.00 | 1.94 | 0.06 | 7.80 | 6.30 | 5.75 | 0.94 | 1312 |

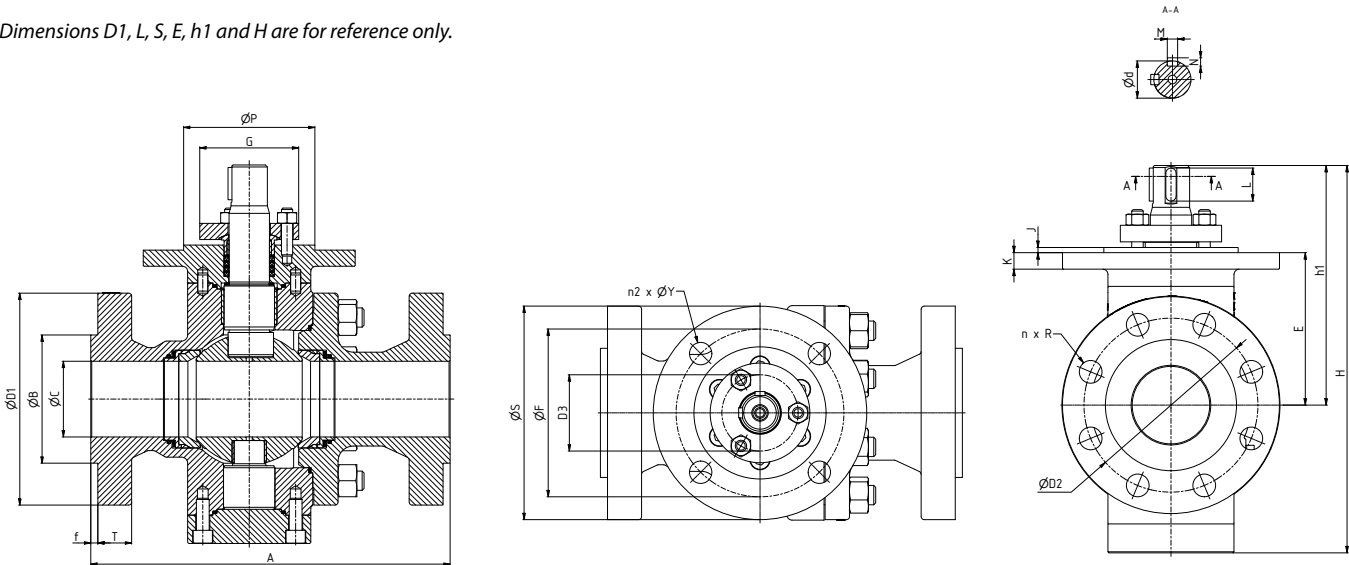
| DN | NPS | Dimensions (inch) | | | | | | | | | | | |
|-----|-----|-------------------|-------|------|-----|----|------|------|------|------|------|------|------|
| | | ISO 5211 | ØS | ØP | ØF | n2 | ØY | K | J | Ød | L | M | N |
| 200 | 8" | F16 | 8.27 | 5.12 | 6.5 | 4 | 0.83 | 0.83 | 0.20 | 2.36 | 2.76 | 0.71 | 0.43 |
| 250 | 10" | F25 | 11.81 | 7.87 | 10 | 8 | 0.67 | 0.71 | 0.20 | 2.36 | 3.94 | 0.71 | 0.43 |
| 300 | 12" | F25 | 11.81 | 7.87 | 10 | 8 | 0.67 | 1.18 | 0.20 | 2.83 | 4.33 | 0.79 | 0.47 |

| DN | NPS | Dimensions (mm) | | | | | | | | | | | | | | | | Weights (kg) |
|-----|-----|-----------------|-----|-----|-------|-----|-------|-------|----|------|-------|------|-----|-----|-----|-----|----|--------------|
| | | A | ØC | H | h1 | E | ØD1 | ØD2 | n | R | ØB | T | f | O | G | D3 | R1 | |
| 200 | 8" | 502 | 202 | 609 | 374.0 | 256 | 381.0 | 330.2 | 12 | 25.4 | 269.8 | 39.5 | 1.6 | 182 | 128 | 130 | 24 | 234.6 |
| 250 | 10" | 568 | 252 | 716 | 443.0 | 290 | 445.0 | 387.4 | 16 | 28.6 | 323.8 | 46.1 | 1.6 | 182 | 128 | 130 | 24 | 414.5 |
| 300 | 12" | 648 | 303 | 824 | 497.5 | 335 | 520.7 | 450.8 | 16 | 31.8 | 381.0 | 49.2 | 1.6 | 198 | 160 | 146 | 24 | 595.3 |

| DN | NPS | Dimensions (mm) | | | | | | | | | | | |
|-----|-----|-----------------|-----|-----|-----|----|-----|----|---|----|-----|----|----|
| | | ISO 5211 | ØS | ØP | ØF | n2 | ØY | K | J | Ød | L | M | N |
| 200 | 8" | F16 | 210 | 130 | 165 | 4 | Ø21 | 21 | 5 | 60 | 70 | 18 | 11 |
| 250 | 10" | F25 | 300 | 200 | 254 | 8 | Ø17 | 18 | 5 | 60 | 100 | 18 | 11 |
| 300 | 12" | F25 | 300 | 200 | 254 | 8 | Ø17 | 30 | 5 | 72 | 110 | 20 | 12 |

Trunnion Design Dimensions and Weights Class 600

Dimensions D1, L, S, E, h1 and H are for reference only.



| DN | NPS | Dimensions (inch) | | | | | | | | | | | | | | Weights (lb) |
|-----|-----|-------------------|-------|-------|-------|-------|-------|-------|----|------|-------|------|------|------|------|--------------|
| | | A | ØC | H | h1 | E | ØD1 | ØD2 | n | R | ØB | T | f | h2 | I | |
| 50 | 2" | 11.50 | 1.93 | 13.03 | 9.02 | 4.76 | 6.50 | 5.00 | 8 | 0.75 | 3.63 | 1.00 | 0.25 | 3.31 | 2.56 | 65 |
| 80 | 3" | 14.00 | 2.95 | 16.73 | 11.10 | 5.81 | 8.25 | 6.62 | 8 | 0.87 | 5.00 | 1.25 | 0.25 | 3.86 | 2.95 | 139 |
| 100 | 4" | 17.00 | 3.94 | 17.99 | 11.77 | 6.40 | 10.75 | 8.50 | 8 | 1.00 | 6.19 | 1.50 | 0.25 | 3.86 | 2.95 | 208 |
| 150 | 6" | 22.00 | 5.94 | 23.76 | 15.71 | 9.47 | 14.00 | 11.50 | 12 | 1.14 | 8.50 | 1.88 | 0.25 | 5.51 | 4.33 | 489 |
| 200 | 8" | 26.00 | 7.95 | 28.54 | 17.95 | 11.42 | 16.50 | 13.75 | 12 | 1.26 | 10.63 | 2.19 | 0.25 | 7.01 | 5.59 | 838 |
| 250 | 10" | 31.00 | 9.92 | 37.32 | 24.69 | 13.58 | 20.00 | 17.00 | 16 | 1.38 | 12.75 | 2.50 | 0.25 | 7.01 | 5.59 | 1371 |
| 300 | 12" | 33.00 | 11.93 | 40.67 | 26.93 | 15.43 | 22.00 | 19.25 | 20 | 1.38 | 15.00 | 2.62 | 0.25 | 7.52 | 6.10 | 1866 |

| DN | NPS | Dimensions (inch) | | | | | | | | | | | |
|-----|-----|-------------------|-------|------|-------|----|------|------|------|------|------|------|------|
| | | ISO 5211 | ØS | ØP | ØF | n2 | ØY | K | J | Ød | L | M | N |
| 50 | 2" | F12 | 5.91 | 3.35 | 4.92 | 4 | 0.53 | 0.63 | 0.12 | 1.10 | 0.98 | 0.31 | 0.28 |
| 80 | 3" | F16 | 8.27 | 5.12 | 6.50 | 4 | 0.87 | 0.63 | 0.20 | 1.42 | 1.26 | 0.39 | 0.31 |
| 100 | 4" | F16 | 8.27 | 5.12 | 6.50 | 4 | 0.87 | 0.63 | 0.20 | 1.50 | 1.26 | 0.39 | 0.31 |
| 150 | 6" | F25 | 11.81 | 7.87 | 10.00 | 8 | 0.69 | 0.98 | 0.20 | 2.17 | 2.20 | 0.63 | 0.39 |
| 200 | 8" | F25 | 11.81 | 7.87 | 10.00 | 8 | 0.69 | 0.98 | 0.20 | 2.56 | 2.48 | 0.71 | 0.43 |
| 250 | 10" | F30 | 13.39 | 9.06 | 11.73 | 8 | 0.87 | 1.18 | 0.20 | 2.83 | 3.15 | 0.79 | 0.47 |
| 300 | 12" | F30 | 13.39 | 9.06 | 11.73 | 8 | 0.87 | 1.18 | 0.20 | 3.35 | 3.54 | 0.87 | 0.55 |

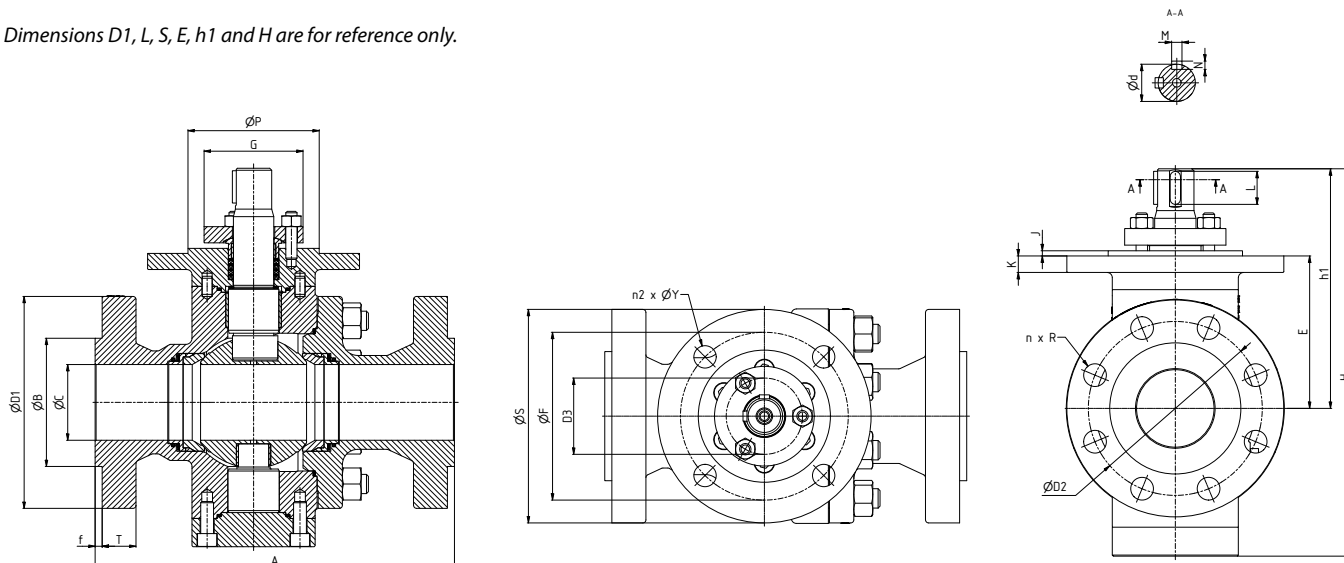
| DN | NPS | Dimensions (mm) | | | | | | | | | | | | | | Weights (kg) |
|-----|-----|-----------------|-----|------|-----|-------|-----|-------|----|------|-------|------|---|-----|-----|--------------|
| | | A | ØC | H | h1 | E | ØD1 | ØD2 | n | R | ØB | T | f | h2 | I | |
| 50 | 2" | 292 | 49 | 331 | 229 | 121.0 | 165 | 127.0 | 8 | 19.0 | 92.1 | 26.5 | 7 | 84 | 65 | 29.5 |
| 80 | 3" | 356 | 75 | 425 | 282 | 147.6 | 210 | 168.3 | 8 | 22.0 | 127.0 | 33.5 | 7 | 98 | 75 | 63.1 |
| 100 | 4" | 432 | 100 | 457 | 299 | 162.6 | 275 | 215.9 | 8 | 25.4 | 157.2 | 40.0 | 7 | 98 | 75 | 94.5 |
| 150 | 6" | 559 | 151 | 604 | 399 | 240.6 | 355 | 292.1 | 12 | 29.0 | 215.9 | 47.7 | 7 | 140 | 110 | 221.9 |
| 200 | 8" | 660 | 202 | 725 | 456 | 290.0 | 420 | 349.2 | 12 | 32.0 | 269.9 | 55.6 | 7 | 178 | 142 | 380.0 |
| 250 | 10" | 787 | 252 | 948 | 627 | 345.0 | 510 | 431.8 | 16 | 35.0 | 323.8 | 63.5 | 7 | 178 | 142 | 621.7 |
| 300 | 12" | 838 | 303 | 1033 | 684 | 392.0 | 560 | 489.0 | 20 | 35.0 | 381.0 | 66.7 | 7 | 191 | 155 | 846.6 |

| DN | NPS | Dimensions (mm) | | | | | | | | | | | |
|-----|-----|-----------------|-----|-----|-----|----|------|----|---|----|----|----|----|
| | | ISO 5211 | ØS | ØP | ØF | n2 | ØY | K | J | Ød | L | M | N |
| 50 | 2" | F12 | 150 | 85 | 125 | 4 | 13.5 | 16 | 3 | 28 | 25 | 8 | 7 |
| 80 | 3" | F16 | 210 | 130 | 165 | 4 | 22.0 | 16 | 5 | 36 | 32 | 10 | 8 |
| 100 | 4" | F16 | 210 | 130 | 165 | 4 | 22.0 | 16 | 5 | 38 | 32 | 10 | 8 |
| 150 | 6" | F25 | 300 | 200 | 254 | 8 | 17.5 | 25 | 5 | 55 | 56 | 16 | 10 |
| 200 | 8" | F25 | 300 | 200 | 254 | 8 | 17.5 | 25 | 5 | 65 | 63 | 18 | 11 |
| 250 | 10" | F30 | 340 | 230 | 298 | 8 | 22.0 | 30 | 5 | 72 | 80 | 20 | 12 |
| 300 | 12" | F30 | 340 | 230 | 298 | 8 | 22.0 | 30 | 5 | 85 | 90 | 22 | 14 |

Trunnion Design

Dimensions and Weights Class 900

Dimensions D1, L, S, E, h1 and H are for reference only.



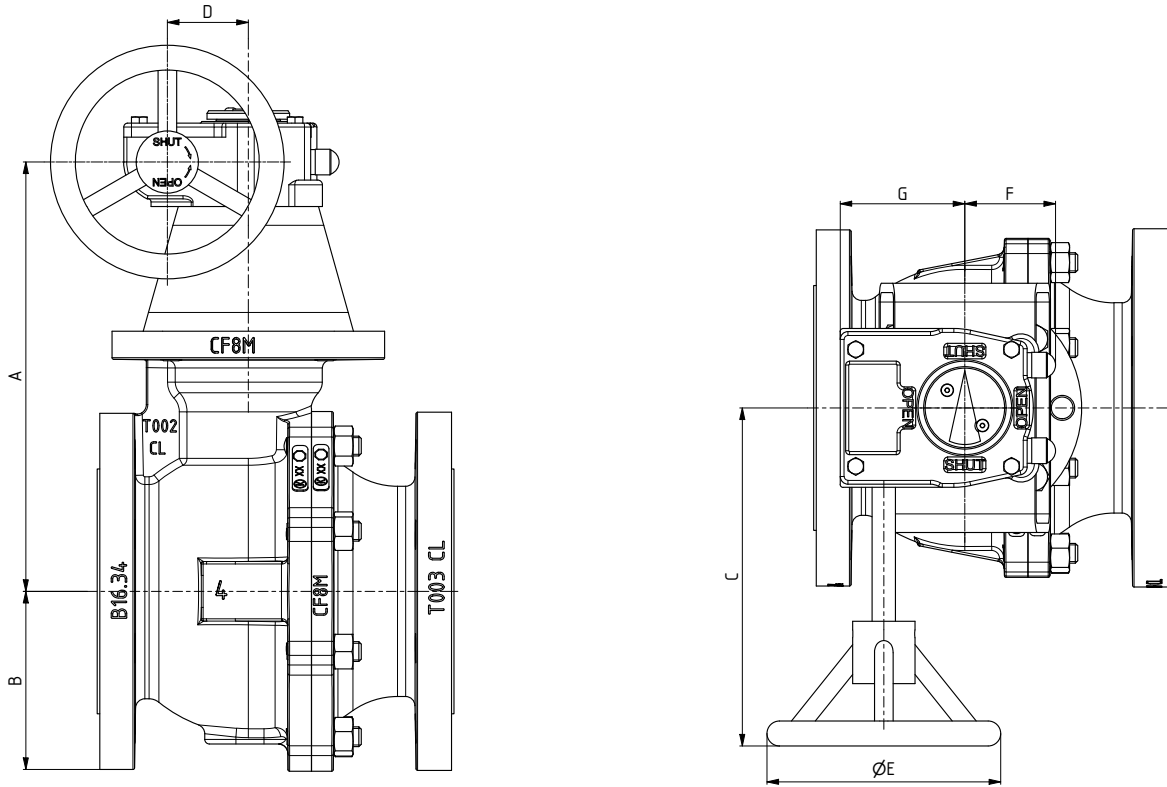
| DN | NPS | Dimensions (inch) | | | | | | | | | | | | | | Weights (lb) |
|-----|-----|-------------------|-------|-------|-------|-------|-------|-------|----|------|-------|------|------|------|------|--------------|
| | | A | ØC | H | h1 | E | ØD1 | ØD2 | n | R | ØB | T | f | h2 | I | |
| 50 | 2" | 14.50 | 1.93 | 13.03 | 9.02 | 4.76 | 8.50 | 6.50 | 8 | 0.98 | 3.63 | 1.50 | 0.25 | 3.31 | 2.56 | 99 |
| 80 | 3" | 15.00 | 2.95 | 16.73 | 11.10 | 5.81 | 9.50 | 7.50 | 8 | 1.00 | 5.00 | 1.50 | 0.25 | 3.86 | 2.95 | 171 |
| 100 | 4" | 18.00 | 3.94 | 19.45 | 12.87 | 7.24 | 11.50 | 9.25 | 8 | 1.25 | 6.19 | 1.75 | 0.25 | 4.33 | 3.35 | 298 |
| 150 | 6" | 24.00 | 5.94 | 24.57 | 15.71 | 9.47 | 15.00 | 12.50 | 12 | 1.25 | 8.50 | 2.19 | 0.25 | 5.51 | 4.33 | 606 |
| 200 | 8" | 29.00 | 7.95 | 34.25 | 23.15 | 12.05 | 18.50 | 15.50 | 12 | 1.50 | 10.63 | 2.50 | 0.25 | 7.01 | 5.59 | 1111 |
| 250 | 10" | 33.00 | 9.92 | 38.46 | 25.47 | 13.98 | 21.50 | 18.50 | 16 | 1.50 | 12.75 | 2.75 | 0.25 | 7.52 | 6.10 | 1769 |
| 300 | 12" | 38.00 | 11.93 | 43.62 | 28.86 | 16.57 | 24.00 | 21.00 | 20 | 1.50 | 15.00 | 3.12 | 0.25 | 8.46 | 6.89 | 2618 |

| DN | NPS | Dimensions (inch) | | | | | | | | | | | |
|-----|-----|-------------------|-------|-------|-------|----|------|------|------|------|------|------|------|
| | | ISO 5211 | ØS | ØP | ØF | n2 | ØY | K | J | Ød | L | M | N |
| 50 | 2" | F12 | 5.91 | 3.35 | 4.92 | 4 | 0.53 | 0.63 | 0.12 | 1.10 | 0.98 | 0.31 | 0.28 |
| 80 | 3" | F16 | 8.27 | 5.12 | 6.50 | 4 | 0.87 | 0.63 | 0.20 | 1.42 | 1.26 | 0.39 | 0.31 |
| 100 | 4" | F25 | 11.81 | 7.87 | 10.00 | 8 | 0.69 | 0.98 | 0.20 | 1.65 | 1.57 | 0.47 | 0.31 |
| 150 | 6" | F25 | 11.81 | 7.87 | 10.00 | 8 | 0.69 | 0.98 | 0.20 | 2.17 | 2.20 | 0.63 | 0.39 |
| 200 | 8" | F30 | 13.39 | 9.06 | 11.73 | 8 | 0.87 | 1.18 | 0.20 | 2.83 | 3.15 | 0.79 | 0.47 |
| 250 | 10" | F30 | 13.39 | 9.06 | 11.73 | 8 | 0.87 | 1.18 | 0.20 | 3.35 | 3.54 | 0.87 | 0.55 |
| 300 | 12" | F35 | 15.94 | 10.24 | 14.02 | 8 | 1.30 | 1.38 | 0.20 | 3.86 | 4.33 | 1.10 | 0.63 |

| DN | NPS | Dimensions (mm) | | | | | | | | | | | | | | Weights (kg) |
|-----|-----|-----------------|-----|------|-----|-------|-----|-------|----|------|-------|------|---|-----|-----|--------------|
| | | A | ØC | H | h1 | E | ØD1 | ØD2 | n | R | ØB | T | f | h2 | I | |
| 50 | 2" | 368 | 49 | 331 | 229 | 121.0 | 215 | 165 | 8 | 25.0 | 92.1 | 40.0 | 7 | 84 | 65 | 44.7 |
| 80 | 3" | 381 | 75 | 425 | 282 | 147.6 | 240 | 190.5 | 8 | 25.4 | 127.0 | 39.5 | 7 | 98 | 75 | 77.4 |
| 100 | 4" | 457 | 100 | 494 | 327 | 184.0 | 290 | 235 | 8 | 31.8 | 157.2 | 46.0 | 7 | 110 | 85 | 135.1 |
| 150 | 6" | 610 | 151 | 624 | 399 | 240.6 | 380 | 317.5 | 12 | 31.8 | 215.9 | 55.6 | 7 | 140 | 110 | 275 |
| 200 | 8" | 737 | 202 | 870 | 588 | 306.0 | 470 | 393.7 | 12 | 38.0 | 269.9 | 63.5 | 7 | 178 | 142 | 503.9 |
| 250 | 10" | 838 | 252 | 977 | 647 | 355.0 | 545 | 469.9 | 16 | 38.0 | 323.8 | 69.9 | 7 | 191 | 155 | 802.2 |
| 300 | 12" | 965 | 303 | 1108 | 733 | 421.0 | 610 | 533.4 | 20 | 38.0 | 381.0 | 79.4 | 7 | 215 | 175 | 1187.3 |

| DN | NPS | Dimensions (mm) | | | | | | | | | | | |
|-----|-----|-----------------|-----|-----|-----|----|------|----|---|----|-----|----|----|
| | | ISO 5211 | ØS | ØP | ØF | n2 | ØY | K | J | Ød | L | M | N |
| 50 | 2" | F12 | 150 | 85 | 125 | 4 | 13.5 | 16 | 3 | 28 | 25 | 8 | 7 |
| 80 | 3" | F16 | 210 | 130 | 165 | 4 | 22.0 | 16 | 5 | 36 | 32 | 10 | 8 |
| 100 | 4" | F25 | 300 | 200 | 254 | 8 | 17.5 | 25 | 5 | 42 | 40 | 12 | 8 |
| 150 | 6" | F25 | 300 | 200 | 254 | 8 | 17.5 | 25 | 5 | 55 | 56 | 16 | 10 |
| 200 | 8" | F30 | 340 | 230 | 298 | 8 | 22.0 | 30 | 5 | 72 | 80 | 20 | 12 |
| 250 | 10" | F30 | 340 | 230 | 298 | 8 | 22.0 | 30 | 5 | 85 | 90 | 22 | 14 |
| 300 | 12" | F35 | 405 | 260 | 356 | 8 | 33.0 | 35 | 5 | 98 | 110 | 28 | 16 |

Standard Design with Gears Class 150



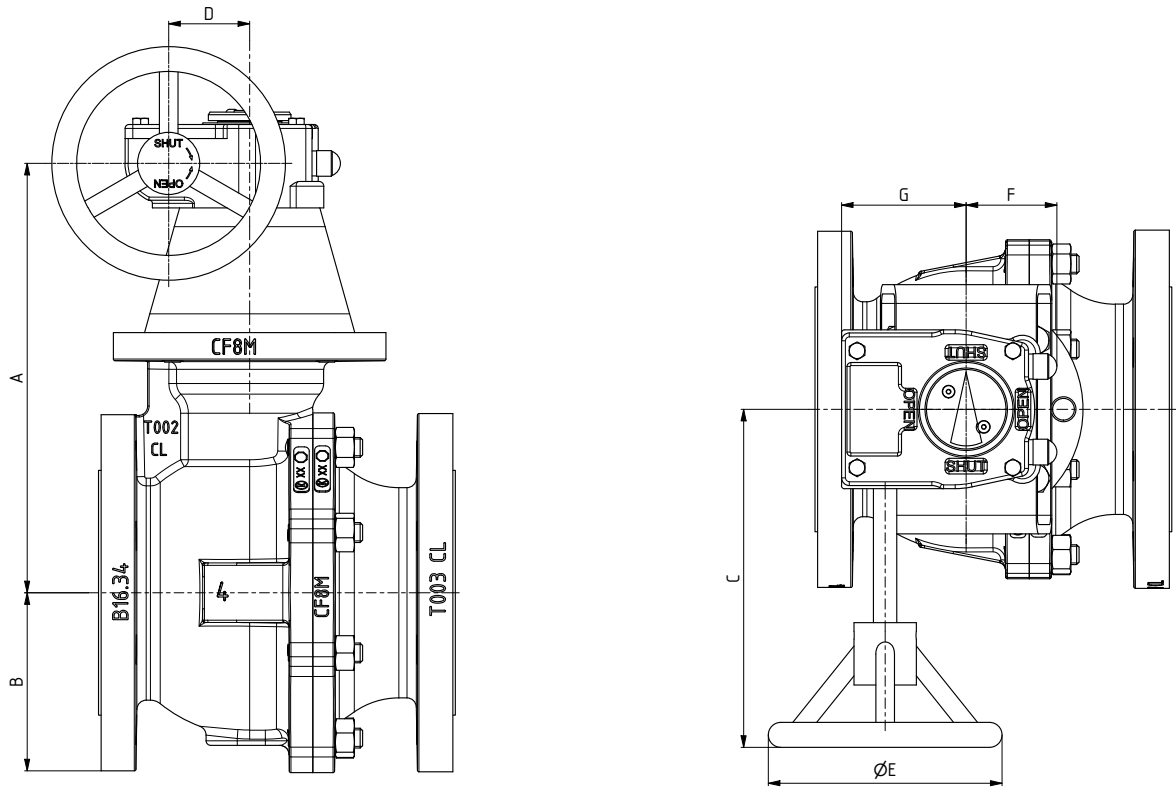
Gear dimensions are for reference only.

| DN | NPS | Dimensions (inch) | | | | | | |
|-----|-----|-------------------|-------|-------|------|-------|------|------|
| | | A | B | C | D | ØE | F | G |
| 100 | 4" | 10.87 | 6.97 | 8.15 | 2.05 | 5.91 | 1.89 | 3.15 |
| 150 | 6" | 13.15 | 6.65 | 10.71 | 3.39 | 11.81 | 3.94 | 4.96 |
| 200 | 8" | 18.03 | 8.90 | 10.98 | 2.80 | 9.84 | 2.72 | 4.13 |
| 250 | 10" | 19.76 | 10.39 | 10.71 | 3.39 | 11.81 | 3.94 | 4.96 |
| 300 | 12" | 22.95 | 12.83 | 12.52 | 4.13 | 13.78 | 4.33 | 5.83 |

| DN | NPS | Dimensions (mm) | | | | | | |
|-----|-----|-----------------|-----|-----|-----|-----|-----|-----|
| | | A | B | C | D | ØE | F | G |
| 100 | 4" | 276 | 177 | 207 | 52 | 150 | 48 | 80 |
| 150 | 6" | 334 | 169 | 272 | 86 | 300 | 100 | 126 |
| 200 | 8" | 458 | 226 | 279 | 71 | 250 | 69 | 105 |
| 250 | 10" | 502 | 264 | 272 | 86 | 300 | 100 | 126 |
| 300 | 12" | 583 | 326 | 318 | 105 | 350 | 110 | 148 |

Gear size is based on clear, clean liquid fluid at maximum differential pressure.

Standard Design with Gears Class 300



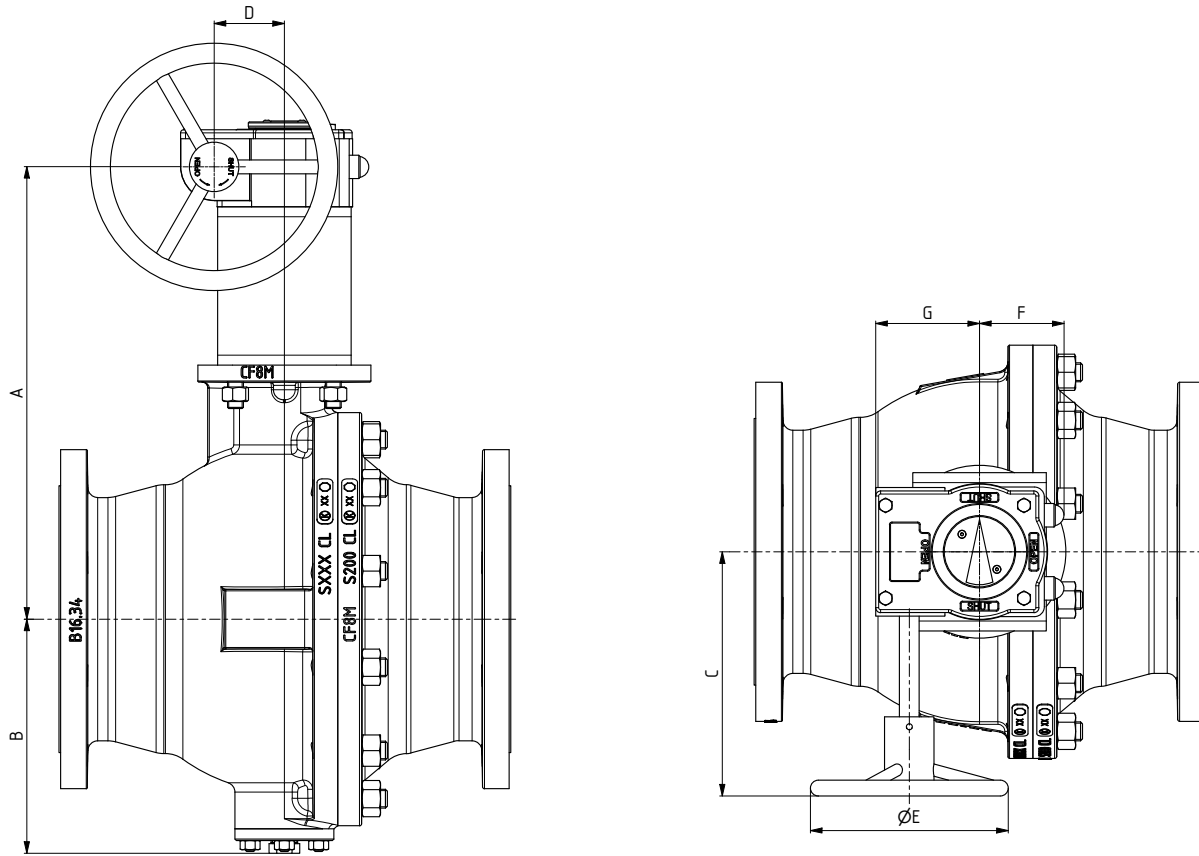
Gear dimensions are for reference only.

| DN | NPS | Dimensions (inch) | | | | | | |
|-----|-----|-------------------|-------|-------|------|-------|------|------|
| | | A | B | C | D | ØE | F | G |
| 80 | 3" | 10.43 | 6.54 | 8.15 | 2.05 | 5.91 | 1.89 | 3.15 |
| 100 | 4" | 11.50 | 5.00 | 10.98 | 2.80 | 9.84 | 2.72 | 4.13 |
| 150 | 6" | 16.14 | 6.73 | 13.62 | 4.13 | 19.69 | 4.33 | 5.83 |
| 200 | 8" | 17.87 | 9.25 | 12.32 | 4.13 | 11.81 | 4.33 | 5.83 |
| 250 | 10" | 21.18 | 10.75 | 13.70 | 4.13 | 17.72 | 4.33 | 5.83 |
| 300 | 12" | 23.23 | 12.87 | 14.92 | 4.17 | 9.84 | 5.63 | 7.09 |

| DN | NPS | Dimensions (mm) | | | | | | |
|-----|-----|-----------------|-----|-----|-----|-----|-----|-----|
| | | A | B | C | D | ØE | F | G |
| 80 | 3" | 265 | 166 | 207 | 52 | 150 | 48 | 80 |
| 100 | 4" | 292 | 127 | 279 | 71 | 250 | 69 | 105 |
| 150 | 6" | 410 | 171 | 346 | 105 | 500 | 110 | 148 |
| 200 | 8" | 454 | 235 | 313 | 105 | 300 | 110 | 148 |
| 250 | 10" | 538 | 273 | 348 | 105 | 450 | 110 | 148 |
| 300 | 12" | 590 | 327 | 379 | 106 | 250 | 143 | 180 |

Gear size is based on clear, clean liquid fluid at maximum differential pressure.

High Temperature Design with Gears Class 150



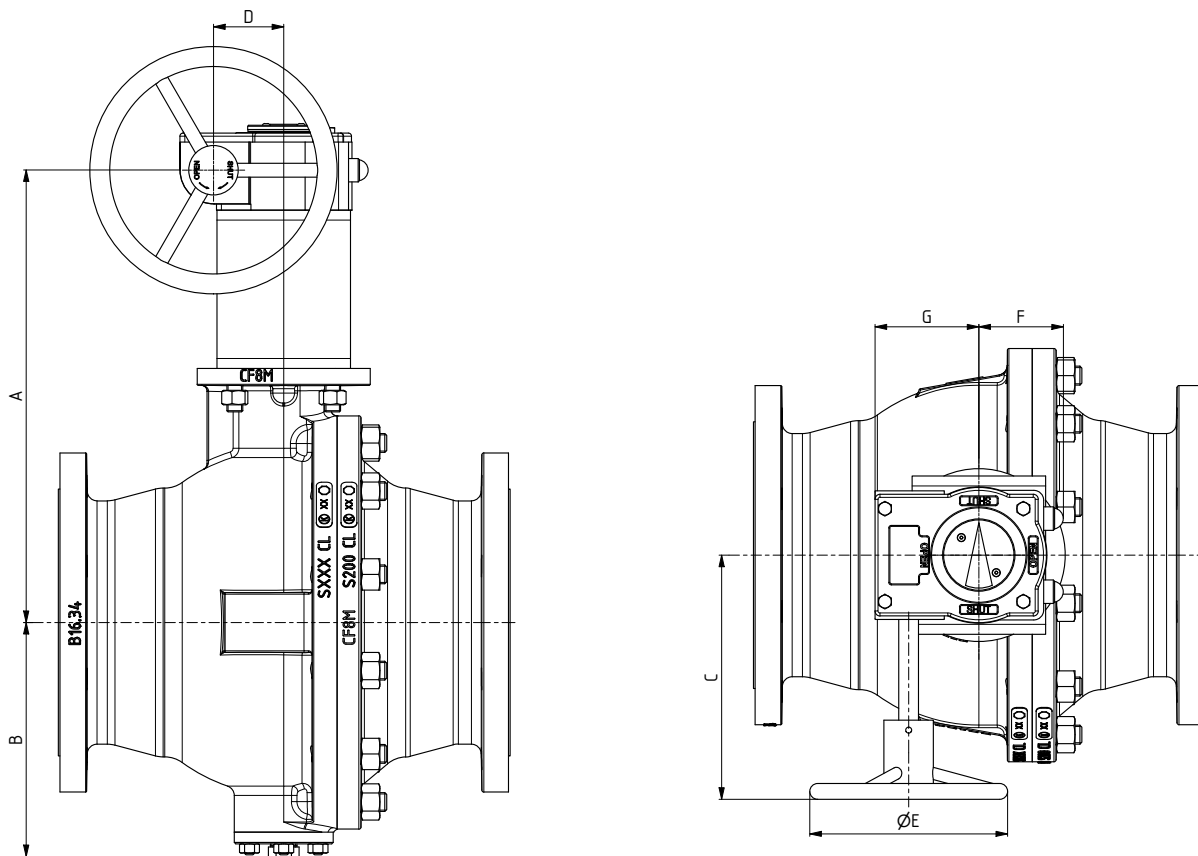
Gear dimensions are for reference only.

| DN | NPS | Dimensions (inch) | | | | | | |
|-----|-----|-------------------|-------|-------|------|-------|------|------|
| | | A | B | C | D | ØE | F | G |
| 100 | 4" | 10.87 | 6.97 | 8.15 | 2.05 | 5.91 | 1.89 | 3.15 |
| 150 | 6" | 13.15 | 6.65 | 10.71 | 3.39 | 11.81 | 3.94 | 4.96 |
| 200 | 8" | 18.07 | 8.90 | 10.51 | 3.39 | 9.84 | 3.94 | 4.96 |
| 250 | 10" | 19.76 | 10.39 | 10.91 | 3.39 | 13.78 | 3.94 | 4.96 |
| 300 | 12" | 22.95 | 12.83 | 13.62 | 4.13 | 19.69 | 4.33 | 5.83 |

| DN | NPS | Dimensions (mm) | | | | | | |
|-----|-----|-----------------|-----|-----|-----|-----|-----|-----|
| | | A | B | C | D | ØE | F | G |
| 100 | 4" | 276 | 177 | 207 | 52 | 150 | 48 | 80 |
| 150 | 6" | 334 | 169 | 272 | 86 | 300 | 100 | 126 |
| 200 | 8" | 459 | 226 | 267 | 86 | 250 | 100 | 126 |
| 250 | 10" | 502 | 264 | 277 | 86 | 350 | 100 | 126 |
| 300 | 12" | 583 | 326 | 346 | 105 | 500 | 110 | 148 |

Gear size is based on clear, clean liquid fluid at maximum differential pressure.

High Temperature Design with Gears Class 300



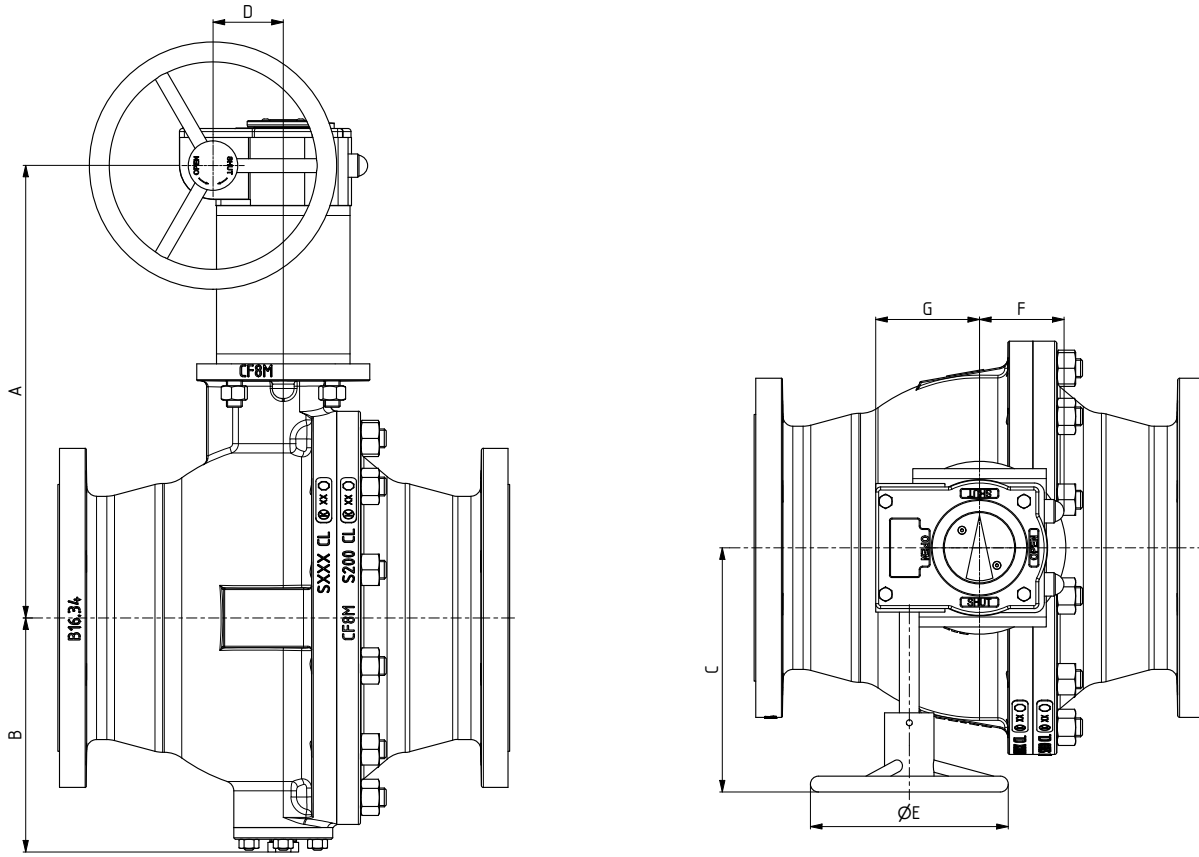
Gear dimensions are for reference only.

| DN | NPS | Dimensions (inch) | | | | | | |
|-----|-----|-------------------|-------|-------|------|-------|------|------|
| | | A | B | C | D | ØE | F | G |
| 80 | 3" | 10.91 | 6.54 | 9.80 | 2.80 | 5.91 | 2.72 | 4.13 |
| 100 | 4" | 11.54 | 5.00 | 10.51 | 3.39 | 9.84 | 3.94 | 4.96 |
| 150 | 6" | 18.39 | 6.73 | 13.74 | 4.17 | 5.91 | 5.63 | 7.09 |
| 200 | 8" | 17.87 | 9.25 | 13.70 | 4.13 | 17.72 | 4.33 | 5.83 |
| 250 | 10" | 21.46 | 10.75 | 13.74 | 4.17 | 7.87 | 5.63 | 7.09 |
| 300 | 12" | 23.50 | 12.87 | 15.43 | 5.51 | 9.84 | 5.59 | 7.68 |

| DN | NPS | Dimensions (mm) | | | | | | |
|-----|-----|-----------------|-----|-----|-----|-----|-----|-----|
| | | A | B | C | D | ØE | F | G |
| 80 | 3" | 277 | 166 | 249 | 71 | 150 | 69 | 105 |
| 100 | 4" | 293 | 127 | 267 | 86 | 250 | 100 | 126 |
| 150 | 6" | 467 | 171 | 349 | 106 | 150 | 143 | 180 |
| 200 | 8" | 454 | 235 | 348 | 105 | 450 | 110 | 148 |
| 250 | 10" | 545 | 273 | 349 | 106 | 200 | 143 | 180 |
| 300 | 12" | 597 | 327 | 392 | 140 | 250 | 142 | 195 |

Gear size is based on clear, clean liquid fluid at maximum differential pressure.

High Temperature Design with Gears Class 600



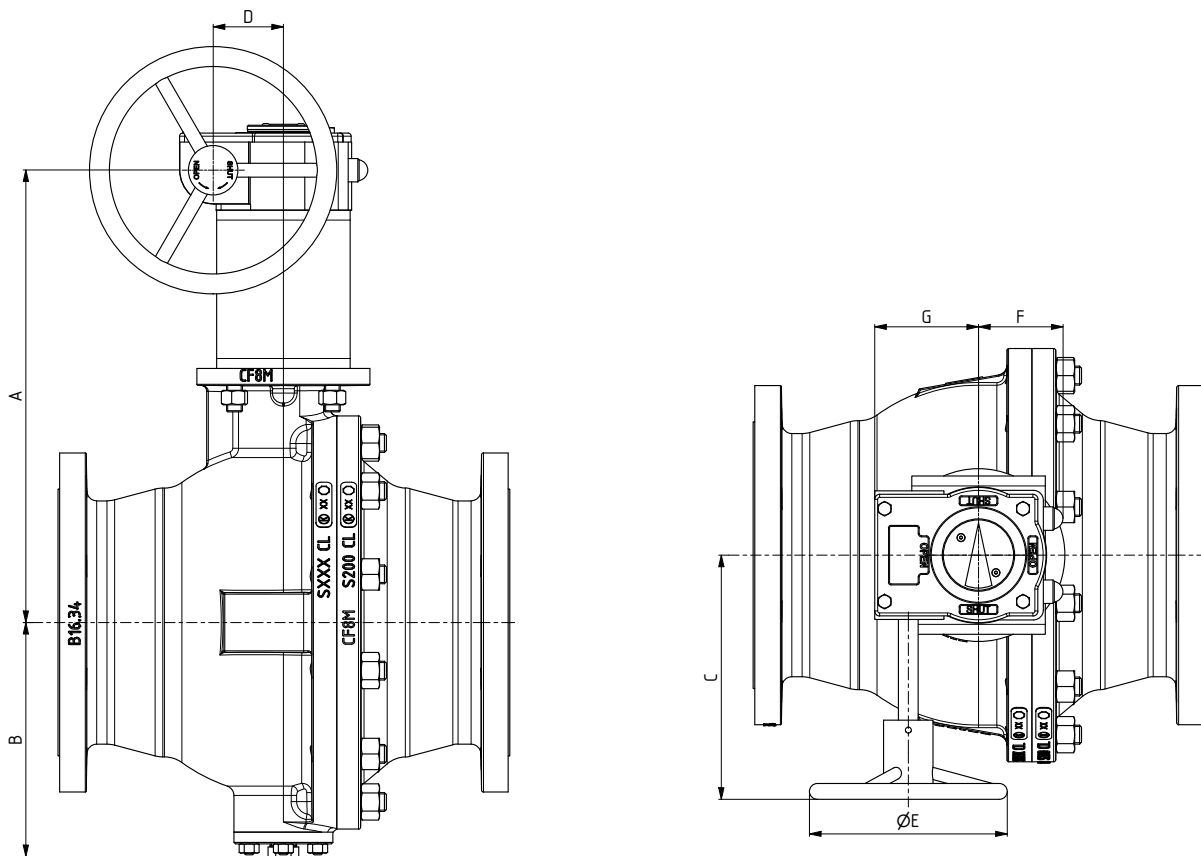
Gear dimensions are for reference only.

| DN | NPS | Dimensions (inch) | | | | | | |
|-----|-----|-------------------|-------|-------|------|-------|------|------|
| | | A | B | C | D | ØE | F | G |
| 50 | 2" | 9.06 | 4.02 | 8.15 | 2.05 | 5.91 | 1.89 | 3.15 |
| 80 | 3" | 5.63 | 5.63 | 10.98 | 2.80 | 9.84 | 2.72 | 4.13 |
| 100 | 4" | 19.57 | 12.87 | 15.63 | 5.51 | 11.81 | 5.59 | 7.68 |
| 150 | 6" | 5.98 | 8.07 | 13.62 | 4.13 | 19.69 | 4.33 | 5.83 |
| 200 | 8" | 6.30 | 10.59 | 15.12 | 4.17 | 11.81 | 5.63 | 7.09 |
| 250 | 10" | 10.55 | 12.64 | 15.63 | 5.51 | 11.81 | 5.59 | 7.68 |
| 300 | 12" | 10.51 | 13.74 | 17.40 | 6.61 | 13.78 | 6.69 | 9.37 |

| DN | NPS | Dimensions (mm) | | | | | | |
|-----|-----|-----------------|-----|-----|-----|-----|-----|-----|
| | | A | B | C | D | ØE | F | G |
| 50 | 2" | 230 | 102 | 207 | 52 | 150 | 48 | 80 |
| 80 | 3" | 143 | 143 | 279 | 71 | 250 | 69 | 105 |
| 100 | 4" | 144 | 158 | 279 | 71 | 250 | 69 | 105 |
| 150 | 6" | 152 | 205 | 346 | 105 | 500 | 110 | 148 |
| 200 | 8" | 160 | 269 | 384 | 106 | 300 | 143 | 180 |
| 250 | 10" | 268 | 321 | 397 | 140 | 300 | 142 | 195 |
| 300 | 12" | 267 | 349 | 442 | 168 | 350 | 170 | 238 |

Gear size is based on clear, clean liquid fluid at maximum differential pressure.

High Temperature Design with Gears Class 900



Gear dimensions are for reference only.

| DN | NPS | Dimensions (inch) | | | | | | |
|-----|-----|-------------------|-------|-------|------|-------|------|-------|
| | | A | B | C | D | ØE | F | G |
| 50 | 2" | 9.06 | 4.02 | 8.15 | 2.05 | 5.91 | 1.89 | 3.15 |
| 80 | 3" | 11.34 | 5.63 | 10.98 | 2.80 | 9.84 | 2.72 | 4.13 |
| 100 | 4" | 12.83 | 6.57 | 12.09 | 3.39 | 17.72 | 3.94 | 4.96 |
| 150 | 6" | 15.63 | 8.86 | 12.60 | 2.09 | 13.78 | 5.59 | 6.22 |
| 200 | 8" | 22.36 | 11.10 | 15.63 | 5.51 | 11.81 | 5.59 | 7.68 |
| 250 | 10" | 24.17 | 12.99 | 17.80 | 6.61 | 15.75 | 6.69 | 9.37 |
| 300 | 12" | 27.80 | 14.76 | 18.23 | 8.23 | 13.78 | 8.19 | 11.18 |

| DN | NPS | Dimensions (mm) | | | | | | |
|-----|-----|-----------------|-----|-----|-----|-----|-----|-----|
| | | A | B | C | D | ØE | F | G |
| 50 | 2" | 230 | 102 | 207 | 52 | 150 | 48 | 80 |
| 80 | 3" | 288 | 143 | 279 | 71 | 250 | 69 | 105 |
| 100 | 4" | 326 | 167 | 307 | 86 | 450 | 100 | 126 |
| 150 | 6" | 397 | 225 | 320 | 53 | 350 | 142 | 158 |
| 200 | 8" | 568 | 282 | 397 | 140 | 300 | 142 | 195 |
| 250 | 10" | 614 | 330 | 452 | 168 | 400 | 170 | 238 |
| 300 | 12" | 706 | 375 | 463 | 209 | 350 | 208 | 284 |

Gear size is based on clear, clean liquid fluid at maximum differential pressure.

Pressure/Temperature Ratings

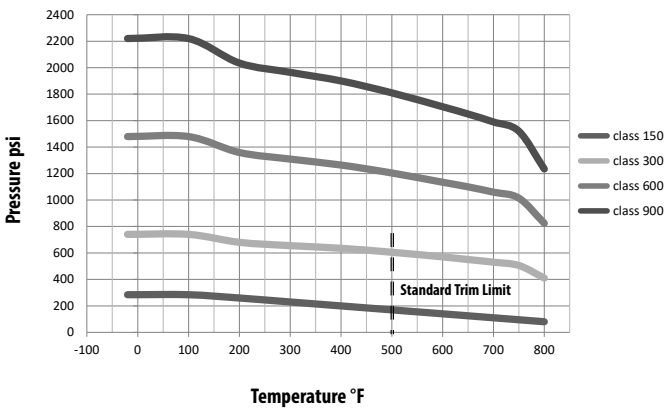
| | Temperature | ASME class 150 | ASME class 300 | ASME class 600 | ASME class 900 |
|--|-------------|--------------------|----------------|----------------|----------------|
| | | ASTM A216 Gr. WCB* | | | |
| | °F | psi | | | |
| Standard Design High Temperature Design | -20 | 285 | 740 | 1480 | 2220 |
| | 100 | 285 | 740 | 1480 | 2220 |
| | 200 | 260 | 680 | 1360 | 2035 |
| | 300 | 230 | 655 | 1310 | 1965 |
| | 400 | 200 | 635 | 1265 | 1900 |
| | 500 | 170 | 605 | 1205 | 1810 |
| | 600 | 140 | 570 | 1135 | 1705 |
| | 650 | 125 | 550 | 1100 | 1650 |
| | 700 | 110 | 530 | 1060 | 1590 |
| | 750 | 95 | 505 | 1015 | 1520 |
| 800 | 80 | 410 | 825 | 1235 | |

*according ASME B16.34 - Material Group 1.1

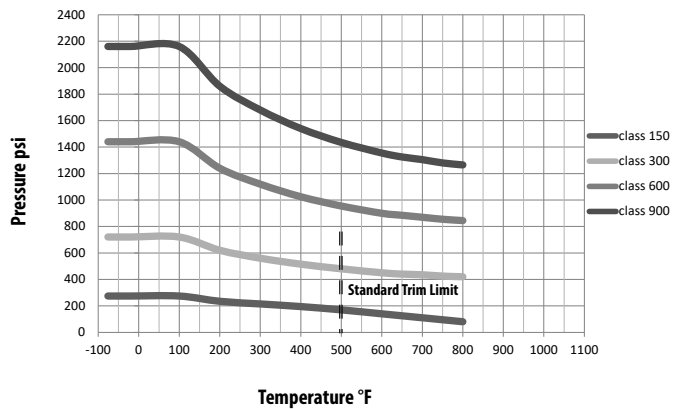
| | Temperature | ASME class 150 | ASME class 300 | ASME class 600 | ASME class 900 |
|--|-------------|---------------------|----------------|----------------|----------------|
| | | ASTM A351 Gr. CF8M* | | | |
| | °F | psi | | | |
| Standard Design High Temperature Design | -76 | 275 | 720 | 1440 | 2160 |
| | -20 | 275 | 720 | 1440 | 2160 |
| | 100 | 275 | 720 | 1440 | 2160 |
| | 200 | 235 | 620 | 1240 | 1860 |
| | 300 | 215 | 560 | 1120 | 1680 |
| | 400 | 195 | 515 | 1025 | 1540 |
| | 500 | 170 | 480 | 955 | 1435 |
| | 600 | 140 | 450 | 900 | 1355 |
| | 650 | 125 | 440 | 885 | 1325 |
| | 700 | 110 | 435 | 870 | 1305 |
| 750 | 95 | 425 | 855 | 1280 | |
| 800 | 80 | 420 | 845 | 1265 | |

*according ASME B16.34 - Material Group 2.2

Pressure & Temperature
 ASTM A216 Gr. WCB



Pressure & Temperature
 ASTM A351 Gr. CF8M



Pressure/Temperature Ratings

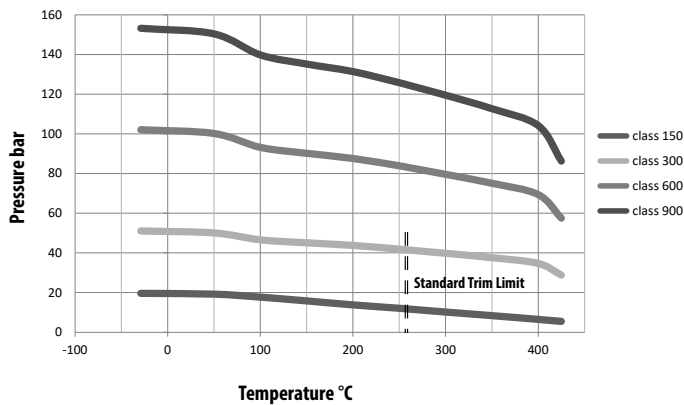
| | Temperature | ASME class 150 | ASME class 300 | ASME class 600 | ASME class 900 | |
|-----------------|-------------------------|--------------------|----------------|----------------|----------------|-------|
| | | ASTM A216 Gr. WCB* | | | | |
| | °C | bar | | | | |
| Standard Design | High Temperature Design | -29 | 19.6 | 51.1 | 102.1 | 153.2 |
| | | 50 | 19.2 | 50.1 | 100.2 | 150.4 |
| | | 100 | 17.7 | 46.6 | 93.2 | 139.8 |
| | | 150 | 15.8 | 45.1 | 90.2 | 135.2 |
| | | 200 | 13.8 | 43.8 | 87.6 | 131.4 |
| | | 250 | 12.1 | 41.9 | 83.9 | 125.8 |
| | | 260 | 11.7 | 41.5 | 83.0 | 124.5 |
| | | 300 | 10.2 | 39.8 | 79.6 | 119.5 |
| | | 350 | 8.4 | 37.6 | 75.1 | 112.7 |
| | | 400 | 6.5 | 34.7 | 69.4 | 104.2 |
| | 425 | 5.5 | 28.8 | 57.5 | 86.3 | |

*according ASME B16.34 - Material Group 1.1

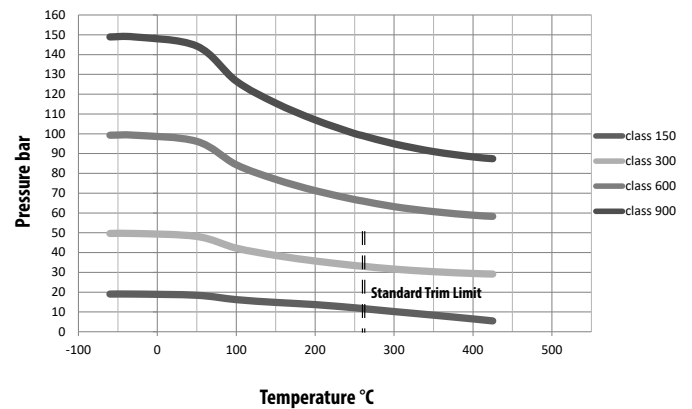
| | Temperature | ASME class 150 | ASME class 300 | ASME class 600 | ASME class 900 | |
|-----------------|-------------------------|---------------------|----------------|----------------|----------------|-------|
| | | ASTM A351 Gr. CF8M* | | | | |
| | °C | bar | | | | |
| Standard Design | High Temperature Design | -60 | 19.0 | 49.6 | 99.3 | 148.9 |
| | | -29 | 19.0 | 49.6 | 99.3 | 148.9 |
| | | 50 | 18.4 | 48.1 | 96.2 | 144.3 |
| | | 100 | 16.2 | 42.2 | 84.4 | 126.6 |
| | | 150 | 14.8 | 38.5 | 77.0 | 115.5 |
| | | 200 | 13.7 | 35.7 | 71.3 | 107.0 |
| | | 250 | 12.1 | 33.4 | 66.8 | 100.1 |
| | | 260 | 11.7 | 33.0 | 66.1 | 99.1 |
| | | 300 | 10.2 | 31.6 | 63.2 | 94.9 |
| | | 350 | 8.4 | 30.3 | 60.7 | 91.0 |
| | 400 | 6.5 | 29.4 | 58.9 | 88.3 | |
| | 425 | 5.5 | 29.1 | 58.3 | 87.4 | |

*according ASME B16.34 - Material Group 2.2

Pressure & Temperature
ASTM A216 Gr. WCB



Pressure & Temperature
ASTM A351 Gr. CF8M



MAST Class 150

Maximum Allowable Stem Torque Class 150

| DN | NPS | MAST [in-Lb] | | | | | | |
|-----------------------------|--------|----------------------|--------------------|----------------------|----------------------|------------------------|------------------------|------------------------|
| | | Stem Material | | | | | | |
| | | A276 Gr431 1.4057 | A182 F51 1.4462 | A564 Gr630 1.4542 | A453 Gr660 1.4980 | A276 Gr316Ti 1.4571 | A276 Gr316 L 1.4404 | A286 GrXM-19 1.3964 |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 956 | 744 | 948 | 1080 | 585 | 470 | 779 |
| 20 | 3/4" | 956 | 744 | 948 | 1080 | 585 | 470 | 779 |
| 25 | 1" | 956 | 744 | 948 | 1080 | 585 | 470 | 779 |
| 40 | 1 1/2" | 2443 | 1895 | 2434 | 2753 | 1390 | 983 | 1992 |
| 50 | 2" | 2443 | 1895 | 2434 | 2753 | 1390 | 983 | 1992 |
| 80 | 3" | 7010 | 5435 | 6966 | 7887 | 3594 | 2532 | 5700 |
| 100 | 4" | 19269 | 14932 | 19154 | 21676 | 10506 | 7409 | 15657 |
| 150 | 6" | 38545 | 29872 | 38298 | 43360 | 23605 | 17552 | 31314 |
| Trunion Design | | | | | | | | |
| 200 | 8" | 67346 | 50282 | 57805 | 67346 | 27385 | 19304 | 44900 |
| 250 | 10" | 67346 | 50282 | 57805 | 67346 | 27385 | 19304 | 44900 |
| 300 | 12" | 130425 | 97385 | 111954 | 130425 | 53043 | 37386 | 86950 |

| DN | NPS | MAST [Nm] | | | | | | |
|-----------------------------|--------|----------------------|--------------------|----------------------|----------------------|------------------------|------------------------|------------------------|
| | | Stem Material | | | | | | |
| | | A276 Gr431 1.4057 | A182 F51 1.4462 | A564 Gr630 1.4542 | A453 Gr660 1.4980 | A276 Gr316Ti 1.4571 | A276 Gr316 L 1.4404 | A286 GrXM-19 1.3964 |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 108 | 84 | 107 | 122 | 66 | 53 | 88 |
| 20 | 3/4" | 108 | 84 | 107 | 122 | 66 | 53 | 88 |
| 25 | 1" | 108 | 84 | 107 | 122 | 66 | 53 | 88 |
| 40 | 1 1/2" | 276 | 214 | 275 | 311 | 157 | 111 | 225 |
| 50 | 2" | 276 | 214 | 275 | 311 | 157 | 111 | 225 |
| 80 | 3" | 792 | 614 | 787 | 891 | 406 | 286 | 644 |
| 100 | 4" | 2177 | 1687 | 2164 | 2449 | 1187 | 837 | 1769 |
| 150 | 6" | 4355 | 3375 | 4327 | 4899 | 2667 | 1983 | 3538 |
| Trunion Design | | | | | | | | |
| 200 | 8" | 7609 | 5681 | 6531 | 7609 | 3094 | 2181 | 5073 |
| 250 | 10" | 7609 | 5681 | 6531 | 7609 | 3094 | 2181 | 5073 |
| 300 | 12" | 14736 | 11003 | 12649 | 14736 | 5993 | 4224 | 9824 |

Maximum Allowable Stem Torque Class 300

| DN | NPS | MAST [in-Lb] | | | | | | |
|-----------------------------|--------|----------------------|--------------------|----------------------|----------------------|------------------------|------------------------|------------------------|
| | | Stem Material | | | | | | |
| | | A276 Gr431 1.4057 | A182 F51 1.4462 | A564 Gr630 1.4542 | A453 Gr660 1.4980 | A276 Gr316Ti 1.4571 | A276 Gr316 L 1.4404 | A286 GrXM-19 1.3964 |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 956 | 744 | 948 | 1080 | 585 | 470 | 779 |
| 20 | 3/4" | 956 | 744 | 948 | 1080 | 585 | 470 | 779 |
| 25 | 1" | 956 | 744 | 948 | 1080 | 585 | 470 | 779 |
| 40 | 1 1/2" | 2443 | 1895 | 2434 | 2753 | 1390 | 983 | 1992 |
| 50 | 2" | 7010 | 5435 | 6966 | 7887 | 3594 | 2532 | 5700 |
| 80 | 3" | 19269 | 14932 | 19154 | 21676 | 10506 | 7409 | 15657 |
| 100 | 4" | 38545 | 29872 | 38298 | 43360 | 23605 | 17552 | 31314 |
| 150 | 6" | 121318 | 97385 | 111954 | 121318 | 53043 | 37386 | 86950 |
| Trunion Design | | | | | | | | |
| 200 | 8" | 104227 | 97385 | 104227 | 104227 | 53043 | 37386 | 86950 |
| 250 | 10" | 130425 | 97385 | 111954 | 130425 | 53043 | 37386 | 86950 |
| 300 | 12" | 223677 | 176989 | 203461 | 223677 | 96394 | 67957 | 158031 |

| DN | NPS | MAST [Nm] | | | | | | |
|-----------------------------|--------|----------------------|--------------------|----------------------|----------------------|------------------------|------------------------|------------------------|
| | | Stem Material | | | | | | |
| | | A276 Gr431 1.4057 | A182 F51 1.4462 | A564 Gr630 1.4542 | A453 Gr660 1.4980 | A276 Gr316Ti 1.4571 | A276 Gr316 L 1.4404 | A286 GrXM-19 1.3964 |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 108 | 84 | 107 | 122 | 66 | 53 | 88 |
| 20 | 3/4" | 108 | 84 | 107 | 122 | 66 | 53 | 88 |
| 25 | 1" | 108 | 84 | 107 | 122 | 66 | 53 | 88 |
| 40 | 1 1/2" | 276 | 214 | 275 | 311 | 157 | 111 | 225 |
| 50 | 2" | 792 | 614 | 787 | 891 | 406 | 286 | 644 |
| 80 | 3" | 2177 | 1687 | 2164 | 2449 | 1187 | 837 | 1769 |
| 100 | 4" | 4355 | 3375 | 4327 | 4899 | 2667 | 1983 | 3538 |
| 150 | 6" | 13707 | 11003 | 12649 | 13707 | 5993 | 4224 | 9824 |
| Trunion Design | | | | | | | | |
| 200 | 8" | 11776 | 11003 | 11776 | 11776 | 5993 | 4224 | 9824 |
| 250 | 10" | 14736 | 11003 | 12649 | 14736 | 5993 | 4224 | 9824 |
| 300 | 12" | 25272 | 19997 | 22988 | 25272 | 10891 | 7678 | 17855 |

MAST Class 600

Maximum Allowable Stem Torque Class 600

| DN | NPS | MAST [in-Lb] | | | | | | |
|-----------------------------|--------|----------------------|--------------------|----------------------|----------------------|------------------------|------------------------|------------------------|
| | | Stem Material | | | | | | |
| | | A276 Gr431 1.4057 | A182 F51 1.4462 | A564 Gr630 1.4542 | A453 Gr660 1.4980 | A276 Gr316Ti 1.4571 | A276 Gr316 L 1.4404 | A286 GrXM-19 1.3964 |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 744 | 744 | 744 | 744 | 664 | 470 | 744 |
| 20 | 3/4" | 1266 | 1266 | 1266 | 1266 | 1266 | 983 | 1266 |
| 25 | 1" | 1930 | 1930 | 1930 | 1930 | 1930 | 1771 | 1930 |
| 40 | 1 1/2" | 2611 | 2611 | 2611 | 2611 | 2611 | 2532 | 2611 |
| Trunion Design | | | | | | | | |
| 50 | 2" | 10657 | 9382 | 10657 | 10657 | 5090 | 3585 | 8338 |
| 80 | 3" | 20127 | 20127 | 20127 | 20127 | 10913 | 7692 | 17897 |
| 100 | 4" | 21251 | 21251 | 21251 | 21251 | 13064 | 9205 | 21251 |
| 150 | 6" | 68346 | 68346 | 68346 | 68346 | 42458 | 29934 | 68346 |
| 200 | 8" | 99952 | 99952 | 99952 | 99952 | 70240 | 49512 | 99952 |
| 250 | 10" | 156570 | 156570 | 156570 | 156570 | 96412 | 67957 | 156570 |
| 300 | 12" | 243378 | 243378 | 243378 | 243378 | 157278 | 110865 | 243378 |

| DN | NPS | MAST [Nm] | | | | | | |
|-----------------------------|--------|----------------------|--------------------|----------------------|----------------------|------------------------|------------------------|------------------------|
| | | Stem Material | | | | | | |
| | | A276 Gr431 1.4057 | A182 F51 1.4462 | A564 Gr630 1.4542 | A453 Gr660 1.4980 | A276 Gr316Ti 1.4571 | A276 Gr316 L 1.4404 | A286 GrXM-19 1.3964 |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 84 | 84 | 84 | 84 | 75 | 53 | 84 |
| 20 | 3/4" | 143 | 143 | 143 | 143 | 143 | 111 | 143 |
| 25 | 1" | 218 | 218 | 218 | 218 | 218 | 200 | 218 |
| 40 | 1 1/2" | 295 | 295 | 295 | 295 | 295 | 286 | 295 |
| Trunion Design | | | | | | | | |
| 50 | 2" | 1204 | 1060 | 1204 | 1204 | 575 | 405 | 942 |
| 80 | 3" | 2274 | 2274 | 2274 | 2274 | 1233 | 869 | 2022 |
| 100 | 4" | 2401 | 2401 | 2401 | 2401 | 1476 | 1040 | 2401 |
| 150 | 6" | 7722 | 7722 | 7722 | 7722 | 4797 | 3382 | 7722 |
| 200 | 8" | 11293 | 11293 | 11293 | 11293 | 7936 | 5594 | 11293 |
| 250 | 10" | 17690 | 17690 | 17690 | 17690 | 10893 | 7678 | 17690 |
| 300 | 12" | 27498 | 27498 | 27498 | 27498 | 17770 | 12526 | 27498 |

MAST Class 900

Maximum Allowable Stem Torque Class 900

| DN | NPS | MAST [in-Lb] | | | | | | |
|-----------------------------|--------|----------------------|--------------------|----------------------|----------------------|------------------------|------------------------|------------------------|
| | | Stem Material | | | | | | |
| | | A276 Gr431 1.4057 | A182 F51 1.4462 | A564 Gr630 1.4542 | A453 Gr660 1.4980 | A276 Gr316Ti 1.4571 | A276 Gr316 L 1.4404 | A286 GrXM-19 1.3964 |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 1266 | 1266 | 1266 | 1266 | 1266 | 983 | 1266 |
| 20 | 3/4" | 1266 | 1266 | 1266 | 1266 | 1266 | 983 | 1266 |
| 25 | 1" | 1930 | 1930 | 1930 | 1930 | 1930 | 1771 | 1930 |
| 40 | 1 1/2" | 2611 | 2611 | 2611 | 2611 | 2611 | 2532 | 2611 |
| Trunion Design | | | | | | | | |
| 50 | 2" | 10657 | 9382 | 10657 | 10657 | 5090 | 3585 | 8338 |
| 80 | 3" | 20127 | 20127 | 20127 | 20127 | 10913 | 7692 | 17897 |
| 100 | 4" | 29580 | 29580 | 29580 | 29580 | 18383 | 12958 | 29580 |
| 150 | 6" | 68346 | 68346 | 68346 | 68346 | 42458 | 29934 | 68346 |
| 200 | 8" | 156570 | 156570 | 156570 | 156570 | 96412 | 67957 | 156570 |
| 250 | 10" | 243378 | 243378 | 243378 | 243378 | 157278 | 110865 | 243378 |
| 300 | 12" | 389690 | 389690 | 389690 | 389690 | 244653 | 172457 | 389690 |

| DN | NPS | MAST [Nm] | | | | | | |
|-----------------------------|--------|----------------------|--------------------|----------------------|----------------------|------------------------|------------------------|------------------------|
| | | Stem Material | | | | | | |
| | | A276 Gr431 1.4057 | A182 F51 1.4462 | A564 Gr630 1.4542 | A453 Gr660 1.4980 | A276 Gr316Ti 1.4571 | A276 Gr316 L 1.4404 | A286 GrXM-19 1.3964 |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 143 | 143 | 143 | 143 | 143 | 111 | 143 |
| 20 | 3/4" | 143 | 143 | 143 | 143 | 143 | 111 | 143 |
| 25 | 1" | 218 | 218 | 218 | 218 | 218 | 200 | 218 |
| 40 | 1 1/2" | 295 | 295 | 295 | 295 | 295 | 286 | 295 |
| Trunion Design | | | | | | | | |
| 50 | 2" | 1204 | 1060 | 1204 | 1204 | 575 | 405 | 942 |
| 80 | 3" | 2274 | 2274 | 2274 | 2274 | 1233 | 869 | 2022 |
| 100 | 4" | 3342 | 3342 | 3342 | 3342 | 2077 | 1464 | 3342 |
| 150 | 6" | 7722 | 7722 | 7722 | 7722 | 4797 | 3382 | 7722 |
| 200 | 8" | 17690 | 17690 | 17690 | 17690 | 10893 | 7678 | 17690 |
| 250 | 10" | 27498 | 27498 | 27498 | 27498 | 17770 | 12526 | 27498 |
| 300 | 12" | 44029 | 44029 | 44029 | 44029 | 27642 | 19485 | 44029 |

Operating Torques Standard Trim KF01176 & KF09176

Torques Class 150

| DN | NPS | Torque [in-Lb] | | | | | | |
|-----------------------------|--------|----------------|------|------|--|------|------|------|
| | | BTO | RUN | ETO | | BTC | RUN | ETC |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 89 | 80 | 80 | | 89 | 80 | 80 |
| 20 | 3/4" | 106 | 80 | 89 | | 97 | 80 | 89 |
| 25 | 1" | 124 | 89 | 89 | | 97 | 89 | 97 |
| 40 | 1 1/2" | 283 | 168 | 177 | | 195 | 168 | 212 |
| 50 | 2" | 451 | 221 | 239 | | 266 | 221 | 319 |
| 80 | 3" | 1372 | 566 | 611 | | 673 | 566 | 903 |
| 100 | 4" | 3009 | 1275 | 1345 | | 1478 | 1275 | 1974 |
| 150 | 6" | 8922 | 3284 | 3576 | | 3939 | 3284 | 5656 |
| Trunion Design | | | | | | | | |
| 200 | 8" | 6125 | 2894 | 3124 | | 3434 | 2894 | 3779 |
| 250 | 10" | 8868 | 4027 | 4443 | | 4886 | 4027 | 5355 |
| 300 | 12" | 16285 | 7373 | 8036 | | 8842 | 7373 | 9966 |

Torques Class 300

| DN | NPS | Torque [in-Lb] | | | | | | |
|-----------------------------|--------|----------------|-------|-------|--|-------|-------|-------|
| | | BTO | RUN | ETO | | BTC | RUN | ETC |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 115 | 80 | 89 | | 97 | 80 | 97 |
| 20 | 3/4" | 142 | 89 | 89 | | 106 | 89 | 115 |
| 25 | 1" | 195 | 97 | 106 | | 115 | 97 | 142 |
| 40 | 1 1/2" | 496 | 204 | 212 | | 239 | 204 | 319 |
| 50 | 2" | 1053 | 451 | 469 | | 522 | 451 | 690 |
| 80 | 3" | 3381 | 1275 | 1319 | | 1443 | 1275 | 2106 |
| 100 | 4" | 6753 | 2292 | 2363 | | 2593 | 2292 | 4045 |
| 150 | 6" | 21375 | 6576 | 6868 | | 7559 | 6576 | 12497 |
| Trunion Design | | | | | | | | |
| 200 | 8" | 13940 | 5974 | 6196 | | 6815 | 5974 | 8674 |
| 250 | 10" | 20118 | 7948 | 8355 | | 9187 | 7948 | 12028 |
| 300 | 12" | 33934 | 12745 | 13409 | | 14745 | 12745 | 19658 |

| DN | NPS | Torque [Nm] | | | | | | |
|-----------------------------|--------|-------------|-----|-----|--|-----|-----|------|
| | | BTO | RUN | ETO | | BTC | RUN | ETC |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 10 | 9 | 9 | | 10 | 9 | 9 |
| 20 | 3/4" | 12 | 9 | 10 | | 11 | 9 | 10 |
| 25 | 1" | 14 | 10 | 10 | | 11 | 10 | 11 |
| 40 | 1 1/2" | 32 | 19 | 20 | | 22 | 19 | 24 |
| 50 | 2" | 51 | 25 | 27 | | 30 | 25 | 36 |
| 80 | 3" | 155 | 64 | 69 | | 76 | 64 | 102 |
| 100 | 4" | 340 | 144 | 152 | | 167 | 144 | 223 |
| 150 | 6" | 1008 | 371 | 404 | | 445 | 371 | 639 |
| Trunion Design | | | | | | | | |
| 200 | 8" | 692 | 327 | 353 | | 388 | 327 | 427 |
| 250 | 10" | 1002 | 455 | 502 | | 552 | 455 | 605 |
| 300 | 12" | 1840 | 833 | 908 | | 999 | 833 | 1126 |

| DN | NPS | Torque [Nm] | | | | | | |
|-----------------------------|--------|-------------|------|------|--|------|------|------|
| | | BTO | RUN | ETO | | BTC | RUN | ETC |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 13 | 9 | 10 | | 11 | 9 | 11 |
| 20 | 3/4" | 16 | 10 | 10 | | 12 | 10 | 13 |
| 25 | 1" | 22 | 11 | 12 | | 13 | 11 | 16 |
| 40 | 1 1/2" | 56 | 23 | 24 | | 27 | 23 | 36 |
| 50 | 2" | 119 | 51 | 53 | | 59 | 51 | 78 |
| 80 | 3" | 382 | 144 | 149 | | 163 | 144 | 238 |
| 100 | 4" | 763 | 259 | 267 | | 293 | 259 | 457 |
| 150 | 6" | 2415 | 743 | 776 | | 854 | 743 | 1412 |
| Trunion Design | | | | | | | | |
| 200 | 8" | 1575 | 675 | 700 | | 770 | 675 | 980 |
| 250 | 10" | 2273 | 898 | 944 | | 1038 | 898 | 1359 |
| 300 | 12" | 3834 | 1440 | 1515 | | 1666 | 1440 | 2221 |

The torques shown in the chart are for reference only (liquid, Standard Trim, BH Packing, Safety=1.0 at 20/50bar). For application-specific torques, please consult the factory.

BTO = Break to open
RUN = Running
ETO = End to open

BTC = Break to close
RUN = Running
ETC = End to close



Operating Torques High Temperature Trim KF01156 & KF09156

Torques Class 150

| DN | NPS | Torque [in-Lb] | | | | | | |
|-----------------------------|--------|----------------|-------|-------|--|-------|-------|-------|
| | | BTO | RUN | ETO | | BTC | RUN | ETC |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 142 | 124 | 124 | | 142 | 124 | 124 |
| 20 | 3/4" | 150 | 124 | 133 | | 142 | 124 | 133 |
| 25 | 1" | 168 | 133 | 142 | | 150 | 133 | 142 |
| 40 | 1 1/2" | 398 | 283 | 292 | | 319 | 283 | 319 |
| 50 | 2" | 566 | 336 | 354 | | 389 | 336 | 425 |
| 80 | 3" | 1575 | 752 | 797 | | 876 | 752 | 1089 |
| 100 | 4" | 3292 | 1531 | 1602 | | 1761 | 1531 | 2230 |
| 150 | 6" | 9373 | 3691 | 3983 | | 4381 | 3691 | 6054 |
| Trunion Design | | | | | | | | |
| 200 | 8" | 7355 | 4071 | 4523 | | 4974 | 4071 | 5063 |
| 250 | 10" | 10718 | 5788 | 6585 | | 7240 | 5788 | 7284 |
| 300 | 12" | 21109 | 11550 | 12851 | | 14135 | 11550 | 14480 |

Torques Class 300

| DN | NPS | Torque [in-Lb] | | | | | | |
|-----------------------------|--------|----------------|-------|-------|--|-------|-------|-------|
| | | BTO | RUN | ETO | | BTC | RUN | ETC |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 159 | 133 | 133 | | 142 | 133 | 133 |
| 20 | 3/4" | 195 | 133 | 133 | | 150 | 133 | 150 |
| 25 | 1" | 239 | 142 | 150 | | 159 | 142 | 177 |
| 40 | 1 1/2" | 620 | 319 | 327 | | 363 | 319 | 434 |
| 50 | 2" | 1266 | 646 | 664 | | 726 | 646 | 876 |
| 80 | 3" | 3682 | 1540 | 1584 | | 1744 | 1540 | 2372 |
| 100 | 4" | 7222 | 2717 | 2788 | | 3062 | 2717 | 4470 |
| 150 | 6" | 22534 | 7620 | 7913 | | 8709 | 7620 | 13542 |
| Trunion Design | | | | | | | | |
| 200 | 8" | 20587 | 11214 | 12347 | | 13577 | 11214 | 14294 |
| 250 | 10" | 30022 | 15692 | 17675 | | 19445 | 15692 | 20348 |
| 300 | 12" | 49281 | 24826 | 28057 | | 30871 | 24826 | 32659 |

| DN | NPS | Torque [Nm] | | | | | | |
|-----------------------------|--------|-------------|------|------|--|------|------|------|
| | | BTO | RUN | ETO | | BTC | RUN | ETC |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 16 | 14 | 14 | | 16 | 14 | 14 |
| 20 | 3/4" | 17 | 14 | 15 | | 16 | 14 | 15 |
| 25 | 1" | 19 | 15 | 16 | | 17 | 15 | 16 |
| 40 | 1 1/2" | 45 | 32 | 33 | | 36 | 32 | 36 |
| 50 | 2" | 64 | 38 | 40 | | 44 | 38 | 48 |
| 80 | 3" | 178 | 85 | 90 | | 99 | 85 | 123 |
| 100 | 4" | 372 | 173 | 181 | | 199 | 173 | 252 |
| 150 | 6" | 1059 | 417 | 450 | | 495 | 417 | 684 |
| Trunion Design | | | | | | | | |
| 200 | 8" | 831 | 460 | 511 | | 562 | 460 | 572 |
| 250 | 10" | 1211 | 654 | 744 | | 818 | 654 | 823 |
| 300 | 12" | 2385 | 1305 | 1452 | | 1597 | 1305 | 1636 |

| DN | NPS | Torque [Nm] | | | | | | |
|-----------------------------|--------|-------------|------|------|--|------|------|------|
| | | BTO | RUN | ETO | | BTC | RUN | ETC |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 18 | 15 | 15 | | 16 | 15 | 15 |
| 20 | 3/4" | 22 | 15 | 15 | | 17 | 15 | 17 |
| 25 | 1" | 27 | 16 | 17 | | 18 | 16 | 20 |
| 40 | 1 1/2" | 70 | 36 | 37 | | 41 | 36 | 49 |
| 50 | 2" | 143 | 73 | 75 | | 82 | 73 | 99 |
| 80 | 3" | 416 | 174 | 179 | | 197 | 174 | 268 |
| 100 | 4" | 816 | 307 | 315 | | 346 | 307 | 505 |
| 150 | 6" | 2546 | 861 | 894 | | 984 | 861 | 1530 |
| Trunion Design | | | | | | | | |
| 200 | 8" | 2326 | 1267 | 1395 | | 1534 | 1267 | 1615 |
| 250 | 10" | 3392 | 1773 | 1997 | | 2197 | 1773 | 2299 |
| 300 | 12" | 5568 | 2805 | 3170 | | 3488 | 2805 | 3690 |

The torques shown in the chart are for reference only (liquid, High Temperature Design, BH Packing, Safety=1.0 at 20/50bar). For application-specific torques, please consult the factory.

BTO = Break to open
RUN = Running
ETO = End to open

BTC = Break to close
RUN = Running
ETC = End to close

Operating Torques High Temperature Trim KF01156 & KF09156

Torques Class 600

| DN | NPS | Torque [in-Lb] | | | | | | |
|-----------------------------|--------|----------------|-------|-------|-------|-------|-------|--|
| | | BTO | RUN | ETO | BTC | RUN | ETC | |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 177 | 115 | 115 | 124 | 115 | 142 | |
| 20 | 3/4" | 292 | 177 | 177 | 195 | 177 | 221 | |
| 25 | 1" | 531 | 319 | 319 | 354 | 319 | 389 | |
| 40 | 1 1/2" | 1248 | 637 | 646 | 708 | 637 | 859 | |
| Trunion Design | | | | | | | | |
| 50 | 2" | 2018 | 1106 | 1177 | 1292 | 1106 | 1407 | |
| 80 | 3" | 4470 | 2390 | 2576 | 2832 | 2390 | 3089 | |
| 100 | 4" | 6682 | 3222 | 3514 | 3868 | 3222 | 4372 | |
| 150 | 6" | 17958 | 8479 | 9116 | 10019 | 8479 | 11816 | |
| 200 | 8" | 35854 | 15046 | 16170 | 17790 | 15046 | 22322 | |
| 250 | 10" | 53874 | 22746 | 24729 | 27198 | 22746 | 33589 | |
| 300 | 12" | 93552 | 36890 | 40129 | 44139 | 36890 | 56521 | |

Torques Class 900

| DN | NPS | Torque [in-Lb] | | | | | | |
|-----------------------------|--------|----------------|-------|-------|-------|-------|-------|--|
| | | BTO | RUN | ETO | BTC | RUN | ETC | |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 274 | 177 | 177 | 195 | 177 | 212 | |
| 20 | 3/4" | 372 | 195 | 204 | 221 | 195 | 266 | |
| 25 | 1" | 664 | 354 | 363 | 398 | 354 | 469 | |
| 40 | 1 1/2" | 1629 | 726 | 735 | 805 | 726 | 1062 | |
| Trunion Design | | | | | | | | |
| 50 | 2" | 2620 | 1292 | 1363 | 1496 | 1292 | 1752 | |
| 80 | 3" | 5859 | 2823 | 3000 | 3301 | 2823 | 3868 | |
| 100 | 4" | 10594 | 4788 | 5089 | 5594 | 4788 | 6886 | |
| 150 | 6" | 24109 | 10170 | 10807 | 11887 | 10170 | 15179 | |
| 200 | 8" | 51467 | 20578 | 21711 | 23879 | 20578 | 31756 | |
| 250 | 10" | 83949 | 31765 | 33748 | 37129 | 31765 | 50812 | |
| 300 | 12" | 149985 | 56193 | 59433 | 65372 | 56193 | 90286 | |

| DN | NPS | Torque [Nm] | | | | | | |
|-----------------------------|--------|-------------|------|------|------|------|------|--|
| | | BTO | RUN | ETO | BTC | RUN | ETC | |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 20 | 13 | 13 | 14 | 13 | 16 | |
| 20 | 3/4" | 33 | 20 | 20 | 22 | 20 | 25 | |
| 25 | 1" | 60 | 36 | 36 | 40 | 36 | 44 | |
| 40 | 1 1/2" | 141 | 72 | 73 | 80 | 72 | 97 | |
| Trunion Design | | | | | | | | |
| 50 | 2" | 228 | 125 | 133 | 146 | 125 | 159 | |
| 80 | 3" | 505 | 270 | 291 | 320 | 270 | 349 | |
| 100 | 4" | 755 | 364 | 397 | 437 | 364 | 494 | |
| 150 | 6" | 2029 | 958 | 1030 | 1132 | 958 | 1335 | |
| 200 | 8" | 4051 | 1700 | 1827 | 2010 | 1700 | 2522 | |
| 250 | 10" | 6087 | 2570 | 2794 | 3073 | 2570 | 3795 | |
| 300 | 12" | 10570 | 4168 | 4534 | 4987 | 4168 | 6386 | |

| DN | NPS | Torque [Nm] | | | | | | |
|-----------------------------|--------|-------------|------|------|------|------|-------|--|
| | | BTO | RUN | ETO | BTC | RUN | ETC | |
| Floating Ball Design | | | | | | | | |
| 15 | 1/2" | 31 | 20 | 20 | 22 | 20 | 24 | |
| 20 | 3/4" | 42 | 22 | 23 | 25 | 22 | 30 | |
| 25 | 1" | 75 | 40 | 41 | 45 | 40 | 53 | |
| 40 | 1 1/2" | 184 | 82 | 83 | 91 | 82 | 120 | |
| Trunion Design | | | | | | | | |
| 50 | 2" | 296 | 146 | 154 | 169 | 146 | 198 | |
| 80 | 3" | 662 | 319 | 339 | 373 | 319 | 437 | |
| 100 | 4" | 1197 | 541 | 575 | 632 | 541 | 778 | |
| 150 | 6" | 2724 | 1149 | 1221 | 1343 | 1149 | 1715 | |
| 200 | 8" | 5815 | 2325 | 2453 | 2698 | 2325 | 3588 | |
| 250 | 10" | 9485 | 3589 | 3813 | 4195 | 3589 | 5741 | |
| 300 | 12" | 16946 | 6349 | 6715 | 7386 | 6349 | 10201 | |

The torques shown in the chart are for reference only (Liquid, High Temperature Design, BH Packing, Safety=1.0). For application-specific torques, please consult the factory.

BTO = Break to open
 RUN = Running
 ETO = End to open

BTC = Break to close
 RUN = Running
 ETC = End to close

Packing Gland Nut Torques

Packing gland nut torques Class 150

| DN | NPS | Thread Size | Standard Trim | High Temperature Trim |
|-----|--------|---------------|---------------|-----------------------|
| | | | [in-Lb] | [in-Lb] |
| 15 | 1/2" | M30x1 | 1027 | 1027 |
| 20 | 3/4" | M30x1 | 1027 | 1027 |
| 25 | 1" | M30x1 | 1027 | 1027 |
| 40 | 1 1/2" | M36x1,5 | 1983 | 1983 |
| 50 | 2" | M36x1,5 | 1983 | 1983 |
| 80 | 3" | M48x1,5 | 4337 | 3443 |
| 100 | 4" | 7/16" -14 UNC | 239 | 160 |
| 150 | 6" | 7/16" -14 UNC | 213 | 151 |
| 200 | 8" | 5/8" -11 UNC | 1231 | 850 |
| 250 | 10" | 5/8" -11 UNC | 1231 | 850 |
| 300 | 12" | 1" -8 UNC | 3089 | 3098 |

Packing gland nut torques Class 300

| DN | NPS | Thread Size | Standard Trim | High Temperature Trim |
|-----|--------|---------------|---------------|-----------------------|
| | | | [in-Lb] | [in-Lb] |
| 15 | 1/2" | M30x1 | 1027 | 1027 |
| 20 | 3/4" | M30x1 | 1027 | 1027 |
| 25 | 1" | M30x1 | 1027 | 1027 |
| 40 | 1 1/2" | M36x1,5 | 1983 | 1983 |
| 50 | 2" | M48x1,5 | 4337 | 3443 |
| 80 | 3" | 7/16" -14 UNC | 239 | 160 |
| 100 | 4" | 7/16" -14 UNC | 213 | 151 |
| 150 | 6" | 1/2" -13UNC | 390 | 390 |
| 200 | 8" | 1" -8 UNC | 3089 | 3098 |
| 250 | 10" | 1" -8 UNC | 3089 | 3098 |
| 300 | 12" | 1" -8 UNC | 3497 | 3497 |

| DN | NPS | Thread Size | Standard Trim | High Temperature Trim |
|-----|--------|---------------|---------------|-----------------------|
| | | | [Nm] | [Nm] |
| 15 | 1/2" | M30x1 | 116 | 116 |
| 20 | 3/4" | M30x1 | 116 | 116 |
| 25 | 1" | M30x1 | 116 | 116 |
| 40 | 1 1/2" | M36x1,5 | 224 | 224 |
| 50 | 2" | M36x1,5 | 224 | 224 |
| 80 | 3" | M48x1,5 | 490 | 389 |
| 100 | 4" | 7/16" -14 UNC | 27 | 18 |
| 150 | 6" | 7/16" -14 UNC | 24 | 17 |
| 200 | 8" | 5/8" -11 UNC | 139 | 96 |
| 250 | 10" | 5/8" -11 UNC | 139 | 96 |
| 300 | 12" | 1" -8 UNC | 349 | 350 |

| DN | NPS | Thread Size | Standard Trim | High Temperature Trim |
|-----|--------|---------------|---------------|-----------------------|
| | | | [Nm] | [Nm] |
| 15 | 1/2" | M30x1 | 116 | 116 |
| 20 | 3/4" | M30x1 | 116 | 116 |
| 25 | 1" | M30x1 | 116 | 116 |
| 40 | 1 1/2" | M36x1,5 | 224 | 224 |
| 50 | 2" | M48x1,5 | 490 | 389 |
| 80 | 3" | 7/16" -14 UNC | 27 | 18 |
| 100 | 4" | 7/16" -14 UNC | 24 | 17 |
| 150 | 6" | 1/2" -13UNC | 44 | 44 |
| 200 | 8" | 1" -8 UNC | 349 | 350 |
| 250 | 10" | 1" -8 UNC | 349 | 350 |
| 300 | 12" | 1" -8 UNC | 395 | 395 |

Packing Gland Nut Torques

Packing gland nut torques Class 600

| | | | High Temperature Trim |
|-----------------------------|--------|---------------|-----------------------|
| DN | NPS | Thread Size | [in-Lb] |
| Floating Ball Design | | | |
| 15 | 1/2" | M30 x 1 | 1027 |
| 20 | 3/4" | M32 x 1.5 | 1417 |
| 25 | 1" | M42 x 1.5 | 1983 |
| 40 | 1 1/2" | M48 x 1.5 | 3452 |
| Trunion Design | | | |
| 50 | 2" | 7/16" -14 UNC | 443 |
| 80 | 3" | 7/16" -14 UNC | 443 |
| 100 | 4" | 7/16" -14 UNC | 443 |
| 150 | 6" | 3/4" -10 UNC | 2328 |
| 200 | 8" | 3/4" -10 UNC | 2328 |
| 250 | 10" | 3/4" -10 UNC | 2328 |
| 300 | 12" | 7/8" -9 UNC | 3718 |

Packing gland nut torques Class 900

| | | | High Temperature Trim |
|-----------------------------|--------|---------------|-----------------------|
| DN | NPS | Thread Size | [in-Lb] |
| Floating Ball Design | | | |
| 15 | 1/2" | M32 x 1.5 | 1417 |
| 20 | 3/4" | M32 x 1.5 | 1417 |
| 25 | 1" | M42 x 1.5 | 1983 |
| 40 | 1 1/2" | M48 x 1.5 | 3452 |
| Trunion Design | | | |
| 50 | 2" | 7/16" -14 UNC | 443 |
| 80 | 3" | 7/16" -14 UNC | 443 |
| 100 | 4" | 1/2" -13 UNC | 673 |
| 150 | 6" | 3/4" -10 UNC | 2328 |
| 200 | 8" | 3/4" -10 UNC | 2328 |
| 250 | 10" | 7/8" -9 UNC | 3718 |
| 300 | 12" | 1" -8 UNC | 5532 |

| | | | High Temperature Trim |
|-----------------------------|--------|---------------|-----------------------|
| DN | NPS | Thread Size | [Nm] |
| Floating Ball Design | | | |
| 15 | 1/2" | M30 x 1 | 116 |
| 20 | 3/4" | M32 x 1.5 | 160 |
| 25 | 1" | M42 x 1.5 | 224 |
| 40 | 1 1/2" | M48 x 1.5 | 390 |
| Trunion Design | | | |
| 50 | 2" | 7/16" -14 UNC | 50 |
| 80 | 3" | 7/16" -14 UNC | 50 |
| 100 | 4" | 7/16" -14 UNC | 50 |
| 150 | 6" | 3/4" -10 UNC | 263 |
| 200 | 8" | 3/4" -10 UNC | 263 |
| 250 | 10" | 3/4" -10 UNC | 263 |
| 300 | 12" | 7/8" -9 UNC | 420 |

| | | | High Temperature Trim |
|-----------------------------|--------|---------------|-----------------------|
| DN | NPS | Thread Size | [Nm] |
| Floating Ball Design | | | |
| 15 | 1/2" | M32 x 1.5 | 160 |
| 20 | 3/4" | M32 x 1.5 | 160 |
| 25 | 1" | M42 x 1.5 | 224 |
| 40 | 1 1/2" | M48 x 1.5 | 390 |
| Trunion Design | | | |
| 50 | 2" | 7/16" -14 UNC | 50 |
| 80 | 3" | 7/16" -14 UNC | 50 |
| 100 | 4" | 1/2" -13 UNC | 76 |
| 150 | 6" | 3/4" -10 UNC | 263 |
| 200 | 8" | 3/4" -10 UNC | 263 |
| 250 | 10" | 7/8" -9 UNC | 420 |
| 300 | 12" | 1" -8 UNC | 625 |

Body Joint

Body joint torques Class 150

| DN | NPS | Thread Size | [in-Lb] |
|-----------------------------|--------|---------------|---------|
| Floating Ball Design | | | |
| 15 | 1/2" | 5/16" -18 UNC | 142 |
| 20 | 3/4" | 5/16" -18 UNC | 142 |
| 25 | 1" | 5/16" -18 UNC | 142 |
| 40 | 1 1/2" | 7/16" -14 UNC | 389 |
| 50 | 2" | 7/16" -14 UNC | 389 |
| 80 | 3" | 5/8" -11 UNC | 1195 |
| 100 | 4" | 1/2" -13 UNC | 637 |
| 150 | 6" | 3/4" -10 UNC | 2106 |
| Trunion Design | | | |
| 200 | 8" | 3/4" -10 UNC | 2106 |
| 250 | 10" | 3/4" -10 UNC | 2106 |
| 300 | 12" | 7/8" -9 UNC | 3009 |

| DN | NPS | Thread Size | [Nm] |
|-----------------------------|--------|---------------|------|
| Floating Ball Design | | | |
| 15 | 1/2" | 5/16" -18 UNC | 16 |
| 20 | 3/4" | 5/16" -18 UNC | 16 |
| 25 | 1" | 5/16" -18 UNC | 16 |
| 40 | 1 1/2" | 7/16" -14 UNC | 44 |
| 50 | 2" | 7/16" -14 UNC | 44 |
| 80 | 3" | 5/8" -11 UNC | 135 |
| 100 | 4" | 1/2" -13 UNC | 72 |
| 150 | 6" | 3/4" -10 UNC | 238 |
| Trunion Design | | | |
| 200 | 8" | 3/4" -10 UNC | 238 |
| 250 | 10" | 3/4" -10 UNC | 238 |
| 300 | 12" | 7/8" -9 UNC | 340 |

Body joint torques Class 300

| DN | NPS | Thread Size | [in-Lb] |
|-----------------------------|--------|--------------|---------|
| Floating Ball Design | | | |
| 15 | 1/2" | 3/8" -16 UNC | 248 |
| 20 | 3/4" | 3/8" -16 UNC | 248 |
| 25 | 1" | 3/8" -16 UNC | 248 |
| 40 | 1 1/2" | 1/2" -13 UNC | 637 |
| 50 | 2" | 5/8" -11 UNC | 1195 |
| 80 | 3" | 5/8" -11 UNC | 1195 |
| 100 | 4" | 5/8" -11 UNC | 1195 |
| 150 | 6" | 3/4" -10 UNC | 2106 |
| Trunion Design | | | |
| 200 | 8" | 3/4" -10 UNC | 2106 |
| 250 | 10" | 7/8" -9 UNC | 3009 |
| 300 | 12" | 1" -8 UNC | 4425 |

| DN | NPS | Thread Size | [Nm] |
|-----------------------------|--------|--------------|------|
| Floating Ball Design | | | |
| 15 | 1/2" | 3/8" -16 UNC | 28 |
| 20 | 3/4" | 3/8" -16 UNC | 28 |
| 25 | 1" | 3/8" -16 UNC | 28 |
| 40 | 1 1/2" | 1/2" -13 UNC | 72 |
| 50 | 2" | 5/8" -11 UNC | 135 |
| 80 | 3" | 5/8" -11 UNC | 135 |
| 100 | 4" | 5/8" -11 UNC | 135 |
| 150 | 6" | 3/4" -10 UNC | 238 |
| Trunion Design | | | |
| 200 | 8" | 3/4" -10 UNC | 238 |
| 250 | 10" | 7/8" -9 UNC | 340 |
| 300 | 12" | 1" -8 UNC | 500 |

Body joint torques Class 600

| DN | NPS | Thread Size | [in-Lb] |
|-----------------------------|--------|---------------|---------|
| Floating Ball Design | | | |
| 15 | 1/2" | 1/2" -13 UNC | 673 |
| 20 | 3/4" | 9/16" -12 UNC | 947 |
| 25 | 1" | 9/16" -12 UNC | 947 |
| 40 | 1 1/2" | 3/4" -10 UNC | 2328 |
| Trunion Design | | | |
| 50 | 2" | 1/2" -13 UNC | 673 |
| 80 | 3" | 3/4" -10 UNC | 2328 |
| 100 | 4" | 7/8" -9 UNC | 3717 |
| 150 | 6" | 1" -8 UNC | 5532 |
| 200 | 8" | 1 1/4" -8 UNC | 11258 |
| 250 | 10" | 1 3/8" -8 UNC | 15099 |
| 300 | 12" | 1 3/8" -8 UNC | 15099 |

| DN | NPS | Thread Size | [Nm] |
|-----------------------------|--------|---------------|------|
| Floating Ball Design | | | |
| 15 | 1/2" | 1/2" -13 UNC | 76 |
| 20 | 3/4" | 9/16" -12 UNC | 107 |
| 25 | 1" | 9/16" -12 UNC | 107 |
| 40 | 1 1/2" | 3/4" -10 UNC | 263 |
| Trunion Design | | | |
| 50 | 2" | 1/2" -13 UNC | 76 |
| 80 | 3" | 3/4" -10 UNC | 263 |
| 100 | 4" | 7/8" -9 UNC | 420 |
| 150 | 6" | 1" -8 UNC | 625 |
| 200 | 8" | 1 1/4" -8 UNC | 1272 |
| 250 | 10" | 1 3/8" -8 UNC | 1706 |
| 300 | 12" | 1 3/8" -8 UNC | 1706 |

Body joint torques Class 900

| DN | NPS | Thread Size | [in-Lb] |
|-----------------------------|--------|---------------|---------|
| Floating Ball Design | | | |
| 15 | 1/2" | 9/16" -12 UNC | 947 |
| 20 | 3/4" | 5/8" -11 UNC | 1319 |
| 25 | 1" | 5/8" -11 UNC | 1319 |
| 40 | 1 1/2" | 7/8" -9 UNC | 3717 |
| Trunion Design | | | |
| 50 | 2" | 9/16" -12 UNC | 947 |
| 80 | 3" | 7/8" -9 UNC | 3717 |
| 100 | 4" | 1" -8 UNC | 5532 |
| 150 | 6" | 1 1/8" -8 UNC | 8063 |
| 200 | 8" | 1 1/2" -8 UNC | 17640 |
| 250 | 10" | 1 3/4" -8 UNC | 31951 |
| 300 | 12" | 1 3/4" -8 UNC | 31951 |

| DN | NPS | Thread Size | [Nm] |
|-----------------------------|--------|---------------|------|
| Floating Ball Design | | | |
| 15 | 1/2" | 9/16" -12 UNC | 107 |
| 20 | 3/4" | 5/8" -11 UNC | 149 |
| 25 | 1" | 5/8" -11 UNC | 149 |
| 40 | 1 1/2" | 7/8" -9 UNC | 420 |
| Trunion Design | | | |
| 50 | 2" | 9/16" -12 UNC | 107 |
| 80 | 3" | 7/8" -9 UNC | 420 |
| 100 | 4" | 1" -8 UNC | 625 |
| 150 | 6" | 1 1/8" -8 UNC | 911 |
| 200 | 8" | 1 1/2" -8 UNC | 1993 |
| 250 | 10" | 1 3/4" -8 UNC | 3610 |
| 300 | 12" | 1 3/4" -8 UNC | 3610 |

Cover Torques

Cover torques Class 150

| DN | NPS | Thread Size | [in-Lb] |
|-----------------------------|---------|--------------|---------|
| Floating Ball Design | | | |
| 15-150 | 1/2"-6" | N/A | N/A |
| Trunion Design | | | |
| 200 | 8" | 3/8" -16 UNC | 248 |
| 250 | 10" | 3/8" -16 UNC | 248 |
| 300 | 12" | 3/8" -16 UNC | 248 |

| DN | NPS | Thread Size | [Nm] |
|-----------------------------|---------|--------------|------|
| Floating Ball Design | | | |
| 15-150 | 1/2"-6" | N/A | N/A |
| Trunion Design | | | |
| 200 | 8" | 3/8" -16 UNC | 28 |
| 250 | 10" | 3/8" -16 UNC | 28 |
| 300 | 12" | 3/8" -16 UNC | 28 |

Cover torques Class 300

| DN | NPS | Thread Size | [in-Lb] |
|-----------------------------|---------|--------------|---------|
| Floating Ball Design | | | |
| 15-150 | 1/2"-6" | N/A | N/A |
| Trunion Design | | | |
| 200 | 8" | 3/8" -16 UNC | 248 |
| 250 | 10" | 3/8" -16 UNC | 248 |
| 300 | 12" | 3/8" -16 UNC | 248 |

| DN | NPS | Thread Size | [Nm] |
|-----------------------------|---------|--------------|------|
| Floating Ball Design | | | |
| 15-150 | 1/2"-6" | N/A | N/A |
| Trunion Design | | | |
| 200 | 8" | 3/8" -16 UNC | 28 |
| 250 | 10" | 3/8" -16 UNC | 28 |
| 300 | 12" | 3/8" -16 UNC | 28 |

Cover torques Class 600

| DN | NPS | Thread Size | [in-Lb] |
|-----------------------|-----|--------------|---------|
| Trunion Design | | | |
| 50 | 2" | 1/2" -13 UNC | 673 |
| 80 | 3" | 1/2" -13 UNC | 673 |
| 100 | 4" | 1/2" -13 UNC | 673 |
| 150 | 6" | 5/8" -11 UNC | 1319 |
| 200 | 8" | 3/4" -10 UNC | 2328 |
| 250 | 10" | 7/8" -9 UNC | 3718 |
| 300 | 12" | 7/8" -9 UNC | 3718 |

| DN | NPS | Thread Size | [Nm] |
|-----------------------|-----|--------------|------|
| Trunion Design | | | |
| 50 | 2" | 1/2" -13 UNC | 76 |
| 80 | 3" | 1/2" -13 UNC | 76 |
| 100 | 4" | 1/2" -13 UNC | 76 |
| 150 | 6" | 5/8" -11 UNC | 149 |
| 200 | 8" | 3/4" -10 UNC | 263 |
| 250 | 10" | 7/8" -9 UNC | 420 |
| 300 | 12" | 7/8" -9 UNC | 420 |

Cover torques Class 900

| DN | NPS | Thread Size | [in-Lb] |
|-----------------------|-----|---------------|---------|
| Trunion Design | | | |
| 50 | 2" | 1/2" -13 UNC | 673 |
| 80 | 3" | 9/16" -12 UNC | 948 |
| 100 | 4" | 5/8" -11 UNC | 1319 |
| 150 | 6" | 3/4" -10 UNC | 2328 |
| 200 | 8" | 7/8" -9 UNC | 3718 |
| 250 | 10" | 7/8" -9 UNC | 3718 |
| 300 | 12" | 1" -8 UNC | 5532 |

| DN | NPS | Thread Size | [Nm] |
|-----------------------|-----|---------------|------|
| Trunion Design | | | |
| 50 | 2" | 1/2" -13 UNC | 76 |
| 80 | 3" | 9/16" -12 UNC | 107 |
| 100 | 4" | 5/8" -11 UNC | 149 |
| 150 | 6" | 3/4" -10 UNC | 263 |
| 200 | 8" | 7/8" -9 UNC | 420 |
| 250 | 10" | 7/8" -9 UNC | 420 |
| 300 | 12" | 1" -8 UNC | 625 |

Kv / Cv Values

Kv / Cv Values Class 150-900

| DN | NPS | Class 150 | | Class 300 | | Class 600 | | Class 900 | |
|-----|--------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|
| | | 90° | | 90° | | 90° | | 90° | |
| | | Kv | Cv | Kv | Cv | Kv | Cv | Kv | Cv |
| 15 | 1/2" | 13 | 15 | 11 | 13 | 10 | 12 | 9 | 10 |
| 20 | 3/4" | 33 | 38 | 29 | 34 | 26 | 30 | 23 | 27 |
| 25 | 1" | 65 | 75 | 56 | 65 | 48 | 56 | 44 | 51 |
| 40 | 1 1/2" | 172 | 200 | 159 | 184 | 139 | 161 | 121 | 140 |
| 50 | 2" | 322 | 374 | 289 | 335 | 244 | 283 | 213 | 247 |
| 80 | 3" | 1021 | 1184 | 849 | 985 | 743 | 862 | 715 | 829 |
| 100 | 4" | 1839 | 2133 | 1566 | 1817 | 1283 | 1488 | 1242 | 1441 |
| 150 | 6" | 4109 | 4766 | 4058 | 4707 | 3377 | 3917 | 3213 | 3727 |
| 200 | 8" | 8145 | 9448 | 7730 | 8967 | 6626 | 7686 | 6221 | 7216 |
| 250 | 10" | 13415 | 15561 | 12948 | 15020 | 10776 | 12500 | 10397 | 12061 |
| 300 | 12" | 20250 | 23490 | 19580 | 22713 | 16947 | 19659 | 15639 | 18141 |

Product Coding

| PRODUCT LINE | | | | DESIGN | | | | | | |
|--------------|----------------|--------|------------|--------|----------------|-----------|----------------|-----------|----------------|--------------|
| Valve | General Design | Bonnet | Valve Type | Size | Pressure Class | Seat Type | Sealing System | Bore Size | End Connection | Face to Face |
| KFO | 1 | 1 | 76 | G | D | B | 1 | 1 | A | 1 |

PRODUCT LINE

| Valve | |
|----------------------------|-----|
| Standard Flange Ball Valve | KFO |

| General Design | |
|-------------------------------------|---|
| cast split body, floating | 1 |
| forged split body, floating | 5 |
| forged split body, trunnion mounted | 7 |
| cast split body, trunnion mounted | 9 |

| Bonnet | |
|------------------|---|
| Standard | 1 |
| Bonnet extension | 2 |

| Valve Type | |
|----------------------------------|----|
| Performance Series (425°C/800°F) | 56 |
| Performance Series (260°C/500°F) | 76 |

DESIGN

| Nominal pipe size | | |
|-------------------|--------|---|
| 1/2" | DN 15 | B |
| 3/4" | DN 20 | C |
| 1" | DN 25 | D |
| 1-1/2" | DN 40 | F |
| 2" | DN 50 | G |
| 3" | DN 80 | I |
| 4" | DN 100 | J |
| 6" | DN 150 | L |
| 8" | DN 200 | M |
| 10" | DN 250 | N |
| 12" | DN 300 | O |

| Pressure Class | |
|----------------|---|
| Class 150 | D |
| Class 300 | G |
| Class 600 | K |
| Class 900 | L |

| Seat Type | |
|-----------------------------|---|
| Double Seat/ Bi-Directional | B |

| Sealing System | |
|-------------------------|---|
| Standard Sealing System | 1 |

| Bore Size | |
|-----------|---|
| Full Port | 1 |

| Connection | |
|-------------------------|---|
| Flanged - ASME B16.5 RF | A |

| Face to Face | |
|------------------|---|
| ASME B16.10 Long | 1 |

Product Coding

| MATERIAL | | | | | | OTHER | | | OPERATION | OPTIONS |
|---------------|---------------|-----------|--------------------|--------------------|----------------|---------------------|--------|--------------------|-----------|---------|
| Body Material | Stem Material | Stem Seal | Ball Base Material | Seat Base Material | Coating System | Maximum Temperature | Jacket | Drain/ Purge Ports | Operator | Options |
| B | H | 2 | F | F | 2 | B | 0 | 0 | F | 0 |

MATERIAL

| Body Material | |
|--------------------------------|---|
| ASTM A216 Gr. WCB | A |
| ASTM A351 Gr. CF8M | B |
| ASTM A995 Gr. 5A - Superduplex | C |
| ASTM A352 Gr. LCB | E |
| ASTM A352 Gr. LCC | F |
| ASTM A217 Gr. WC6 | G |
| ASTM A494 Gr. CY40 | J |
| ASTM A351 Gr. CN7M | K |
| ASTM A351 Gr. CT15C | L |
| ASTM A494 Gr. M35-1 | M |
| ASTM A351 Gr. CF3M | N |
| ASTM A995 Gr. 6A | R |
| ASTM A494 Gr. CX2MW | T |
| Other | X |

| Stem Material | |
|--------------------------------------|---|
| ASTM A564 Gr. 630 (17-4 PH), H1150-D | A |
| ASTM A276 Gr. 420 (UNS S42000) | B |
| ASTM A276 Gr 316Ti (UNS S31635) | C |
| ASTM A182 Gr. F51 (UNS S31803) | D |
| ASTM A638 Gr. 660 (UNS S66286) | E |
| ASTM A286 Gr. XM-19 | F |
| ASTM A276 Gr. 431 (UNS S43100) | H |
| ASTM A182 Gr. F316L (UNS S31603) | I |
| Other | X |

| Stem Seal (Packing) | |
|--|---|
| Standard Graphite | 1 |
| Fugitive Emission Packing (ISO15484/API-641) | 2 |

| Ball Base Material | |
|----------------------------------|---|
| ASTM A276 Gr 316Ti (UNS S31635) | C |
| ASTM A182 Gr. F51 (UNS S31803) | D |
| ASTM A638 Gr. 660 (UNS S66286) | E |
| ASTM A182 Gr. F316L (UNS S31603) | F |
| Other | X |

| Seat Base Material | |
|----------------------------------|---|
| ASTM A276 Gr 316Ti (UNS S31635) | C |
| ASTM A182 Gr. F51 (UNS S31803) | D |
| ASTM A638 Gr. 660 (UNS S66286) | E |
| ASTM A182 Gr. F316L (UNS S31603) | F |
| Other | X |

| Coating System | | |
|----------------|--|---|
| H3 | Ball: M3 Nickel/Chrome (NiCr) Seat: M3 Nickel/Chrome (NiCr) | 2 |
| H4 | Ball: M6 Nickel/Chrome/Tungsten Carbide (NiCr-WC) Seat: M3 Nickel/Chrome (NiCr) | 3 |
| H5 | Ball: M4 Cobalt based (Stellite SF20) Seat: M4 Cobalt based (Stellite SF20) | 4 |
| H6 | Ball: M11 Chromium Carbide/Nickel/Chromium (Cr3C2-NiCr) Seat: M11 Chromium Carbide/Nickel/Chromium (Cr3C2-NiCr) | 5 |
| H10 | Ball: M12 Tungsten Carbide Seat: M12 Tungsten Carbide | 6 |
| H11 | Ball: M2 Hard Chromium (Cr) Seat: M2 Hard Chromium (Cr) | 7 |

OTHER

| Maximum Temperature | |
|---------------------|---|
| 260°C / 500°F | B |
| 425°C / 800°F | C |

| Heating Jacket | |
|----------------|---|
| None | 0 |

| Drain/Purge Ports | |
|-------------------|---|
| None | 0 |

OPERATION

| Operator | |
|---|---|
| Bare Stem | F |
| Lever - Locking | L |
| Gear (manual) | G |
| Actuated (pneumatic, hydraulic, electric) | A |
| Mounting kit w/o Operator | M |
| Extended Lever | J |
| Stem Extension | H |
| Stem Extension with Locking Lever | O |
| Stem Extension with Gear | P |
| Stem Extension with Actuator | R |
| Other | X |

OPTIONS

| Options | |
|----------------------|---|
| None | 0 |
| NACE MR 0103 or 0175 | 1 |
| Special | X |

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